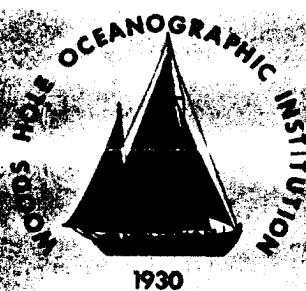


Woods Hole Oceanographic Institution



A COMPILATION OF MOORED CURRENT METER DATA AND ASSOCIATED MOORING ACTION DATA FROM MOORING 522, VOLUME XII (1976 DATA)

by

S. Tarbell, R. Payne
and R. Walden

September 1977

TECHNICAL REPORT

Prepared for the Applied Physics Laboratory of
the Johns Hopkins University under Contract
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A COMPILATION OF MOORED CURRENT METER
DATA AND ASSOCIATED MOORING ACTION DATA
FROM MOORING 592, VOLUME XIV (1976 DATA)

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S. Tarbell, R. Payne
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WOODS HOLE OCEANOGRAPHIC INSTITUTION
Woods Hole, Massachusetts 02543

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ABSTRACT

Summaries of moored current meter data from one mooring set and retrieved in 1976 near St. Croix by the Woods Hole Oceanographic Institution are presented. The averaged current data are presented as statistics, spectral diagrams, plots of vector and scalar quantities versus time. Horizontal and vertical mooring motion data are also presented.

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PREFACE

This volume is the fourteenth of a series of Data Reports presenting moored current meter and associated data collected by the W.H.O.I. Buoy Group.

Volumes I through XIII present data from the years 1963-1970, and three array experiments: the 1970 Pollard array, the 1973 IWEX array and the 1973 MODE array.

Volume fourteen discusses measurements of the motion of a particular mooring and presents the current meter data from that mooring.

Volume *	W.H.O.I. *	Authors	* Notes
Number *	Ref. # *		* years experiment
* * * * *			
1	65-44	Webster, F., and N.P. Fofonoff	
2	66-60	Webster, F., and N.P. Fofonoff	
3	67-66	Webster, F., and N.P. Fofonoff	
4	70-40	Pollard, R.T.	
5	71-50	Tarbell, S., and F. Webster	1966 measurements
6	74-4	Tarbell, S.	1967 measurements
7	74-52	Chausse, D., and S. Tarbell	1968 measurements
8	75-7	Pollard, R.T., and S. Tarbell	1970 Array data
9	75-68	Tarbell, S., M.G. Briscoe, and D. Chausse	1973 IWEX Array
10	76-40	Tarbell, S.	1969 data (early)
11	76-41	Tarbell, S.	1969 data (late)
12	76-101	Chausse, D., and S. Tarbell	1973 MODE Array
13	77-18	Tarbell, S., and A.W. Whitlatch	1970 measurements
14	77-41	Tarbell, S., R. Payne, and R. Walden ⁺	Mooring 592, 1976 Saint Croix
15	77-56	Tarbell, S., and A.W. Whitlatch ⁺	1971 measurements

⁺In press

ACKNOWLEDGMENTS

Planning, staging, executing and processing the data for this experiment involved numbers of people and organizations. The W.H.O.I. Mooring Engineering group consisting of R. G. Walden, C. W. Collins, Jr., P. R. Clay and P. O'Malley designed, prepared, set and retrieved the mooring. J. R. Poirier and C. W. Collins, Jr. prepared the current meters. R. A. La Rochelle prepared the acoustic release. Help in the preparation of the mooring from the W.H.O.I. operations group under the supervision of R. D. Simoneau is gratefully acknowledged. The W.H.O.I. data processing group (D. Chausse, M. Raymer, S. Tarbell and A. Whitlatch) under the supervision of R. E. Payne processed all current meter data and prepared displays for this report. Staff scientists including W. J. Schmitz, Jr., M. G. Briscoe, and N. P. Fofonoff provided guidance and support to the experiment.

Dr. Wenstrand of APL was most helpful in the experiment design and planning. Acoustic release deck command gear was loaned by NADC (D. Closser) and MAS, Christensted (R. Mosey) who also provided other helpful services. Special mention is made of Lt. J. Hollister, an observer from NAVOCEANO whose sharp eyes averted a near-disaster during deployment by spotting an unwelded link of chain in the backup recovery system as it was about to go over the side. The Atlantic Fleet Weapons Training Facility services, under the direction of R. Kirkpatrick, were excellent. Special thanks are due the captains and crews of the deployment vessel USNS LYNCH and the YFU/ASP recovery vessel.

Introduction, Section 1, Mooring Motion

A contract was entered into with The Johns Hopkins University, Applied Physics Laboratory, February 1976, to deploy and retrieve an instrumented intermediate mooring for the Principal Scientist, Dr. David Wenstrand, at the Atlantic Fleet Weapons Training Facility, Frederiksted, St. Croix, U. S. Virgin Islands. The mooring design, preparation, launch and recovery was under the supervision of Robert G. Walden (W.H.O.I.). The current meters and acoustic release were prepared at W.H.O.I. The current meter data were processed under the direction of Dr. Richard E. Payne (W.H.O.I.).

Description of Experiment

The objective of the experiment was to obtain time series of current speed and direction and temperature at five depths over a period of one month and for two months at a sixth depth. The required mooring location was in the vicinity of hydrophone 3 at the St. Croix Atlantic Fleet Weapons Training Facility in approximately 1000 meters water depth. The Training Facility includes an acoustic tracking range which will be referred to in this report as "the range" or "the tracking range". Five vector averaging current meters (VACMs) were employed with a sampling rate of once per 56.2 seconds to provide adequate information on diurnal, semi-diurnal and inertial tidal motions as well as other effects. Originally specified current meter depths were 70, 120, 170, 220 and 270 meters from the surface. The spacing between instruments was required to be accurate to ± 5 meters. The static depth of the top current meter was specified to be within ± 15 meters of 70 meters. The depth of the top current meter was subsequently re-specified to be "no deeper than 100 meters". The sixth current meter was added to the mooring to obtain near-bottom currents for the Naval Facility Engineering Command. The sampling rate of this VACM was half the others (once per 112.5 seconds) allowing its record to be twice as long (two months) as the others. An acoustic pinger was attached near the top of the mooring to obtain tracking data for the determination of mooring motion for 72 hours after launch.

The deployment vessel (USNS LYNCH) was equipped with a hull-mounted acoustic pinger which was tracked by tracking range personnel who provided appropriate track and speed information to the vessel by radio according to a prearranged plan. This tracking service was used for both the preliminary bathymetric survey and the actual mooring deployment. The acoustic

tracking provided by the range was accurate to a meter or so. This accurate position data was imperative to prevent the anchor from damaging the many cables and hydrophones on the bottom. The operation plan is enclosed as Appendix 1. Coordinates given refer to range coordinates in meters from a datum point.

Description of the Mooring

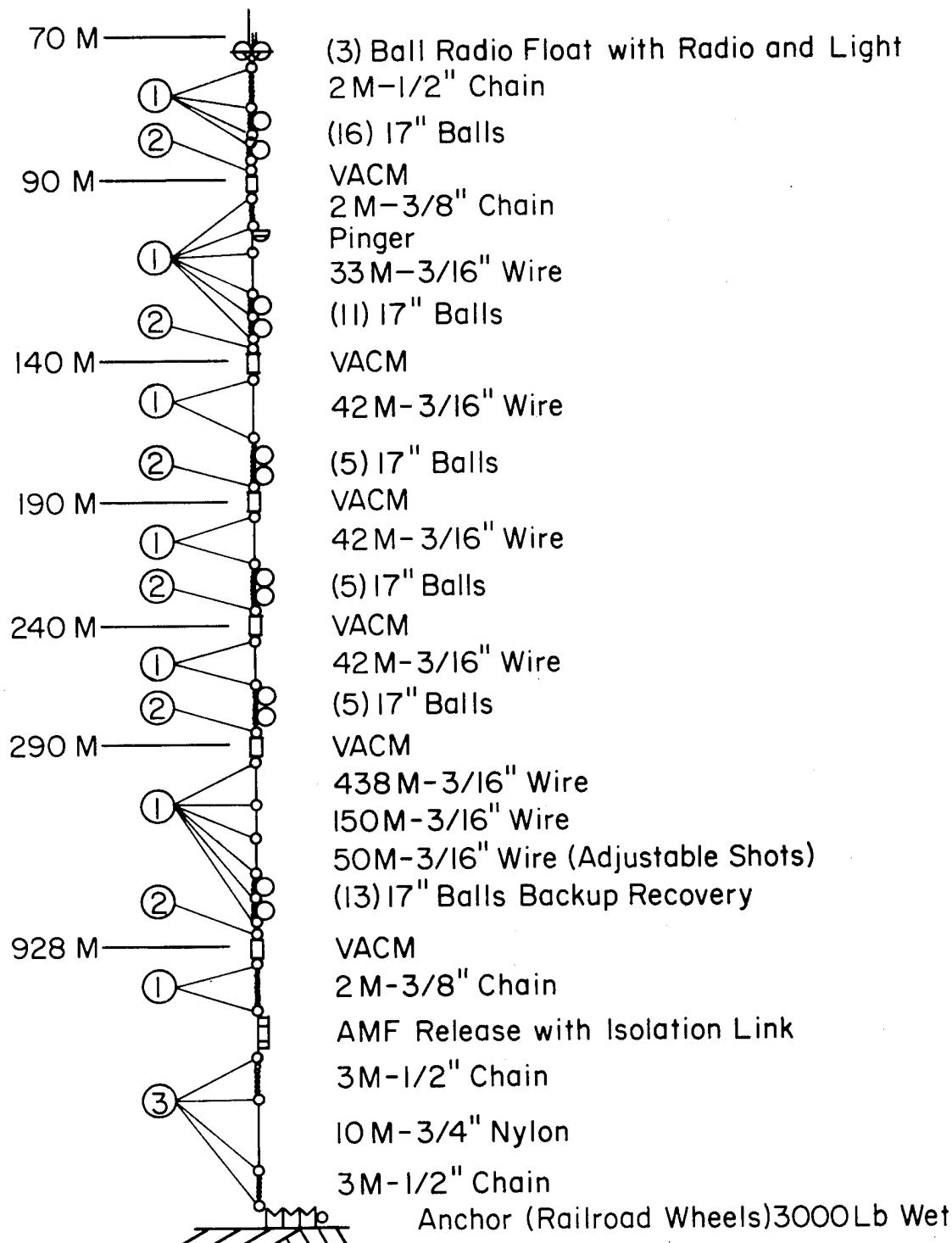
The mooring was patterned after a standard W.H.O.I. intermediate mooring. Figure 1 shows a schematic representation of the mooring. Starting at the top of the mooring the following components were installed. A radio/light float using three seventeen inch glass spheres was used as an aid in mooring recovery. Flotation throughout the mooring consisted of 17" glass spheres in hardhats attached to chain. Chain was also used to connect instruments together when the separation was small. The pinger was supplied by the range and was mounted in a special stainless steel bracket for insertion into the mooring. It was designed to operate continuously on a frequency of 75 kHz for 72 hours. VACMs were inserted at 90, 140, 190, 240, 290 and 928 meters depth beneath the radio float. 3/16" U. S. Steel 3 x 19 torque-balanced wire rope was used throughout the mooring. Thirteen glass spheres were attached above the anchor release to permit a back-up recovery capability in the event that any portion of the mooring parted. An AMF acoustic anchor release Model 322 with a transponder and a disabling feature was employed. A ten meter section of 3/4" nylon line was inserted between the release and the anchor to absorb transients during anchor launch. Five railroad wheels were chained together to provide 3000 pounds (weight in water) for the anchor.

The mooring was designed using the NOYFB computer program (Moller, 1976). Our best estimate of expected currents obtained from various sources were used as program inputs.

Description of Results

The mooring was launched February 20, 1976 and was retrieved April 27, 1976. The anchor location, $17^{\circ} 43.8'N$, $64^{\circ} 56.53'W$, was within 100 meters of the proposed position in water 972 meters deep. The depth of the radio float after settling out was determined to be 71.4 meters by steaming over it and observing its depth on the precision fathometer. The tracking range determination of the pinger depth was 98 meters giving a radio float depth of 74.2 meters, in good agreement with the fathometer-determined depth. The depth of the top VACM at this time was 96 meters.

D≈972 M



Sta. #592

Termination Code

- (1) (2) 1/2" Shackles and (1) 1/2" Master Link
- (2) (3) 1/2" Shackles and (2) 1/2" Master Links
- (3) 5/8" Shackles

Figure 1. St. Croix mooring

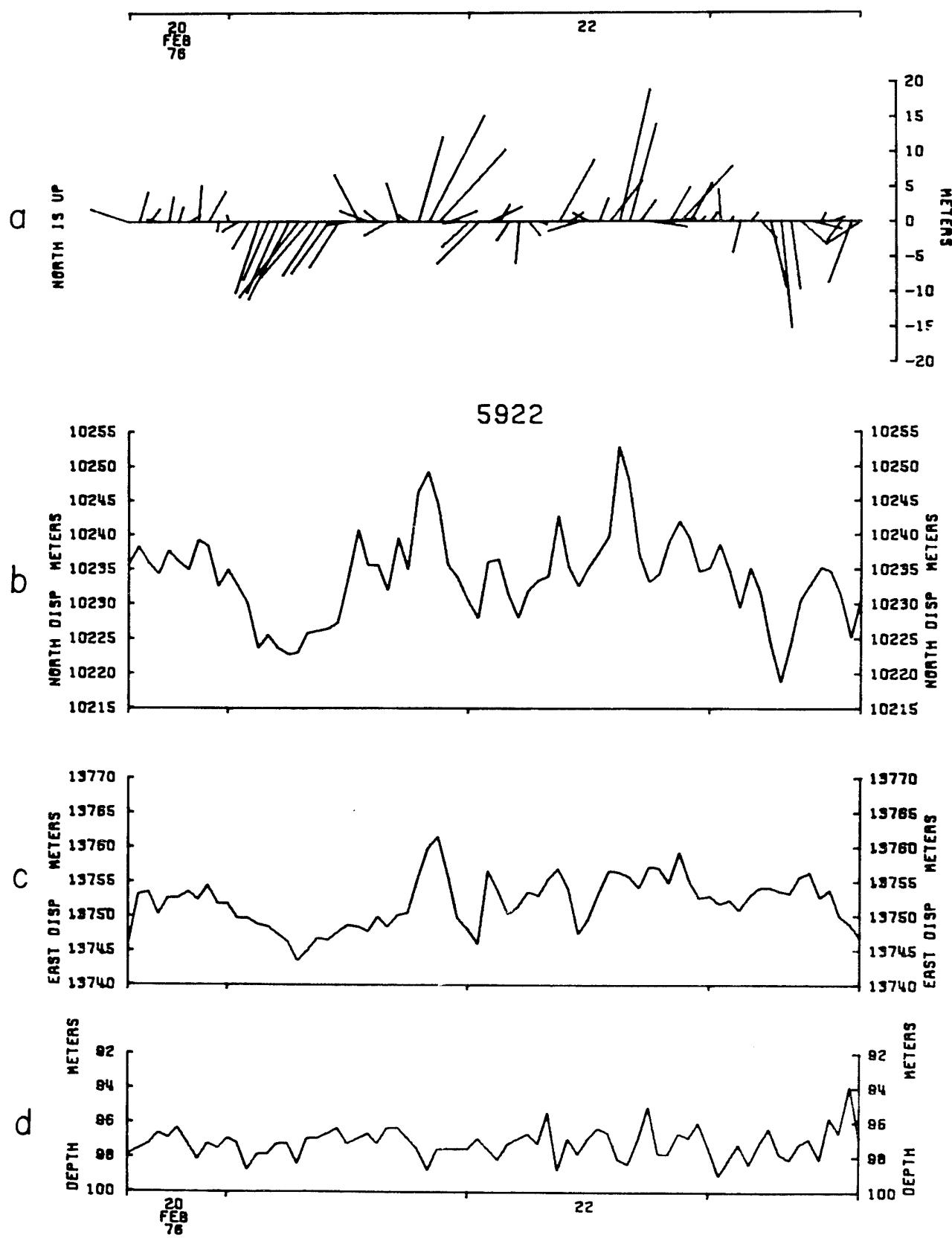
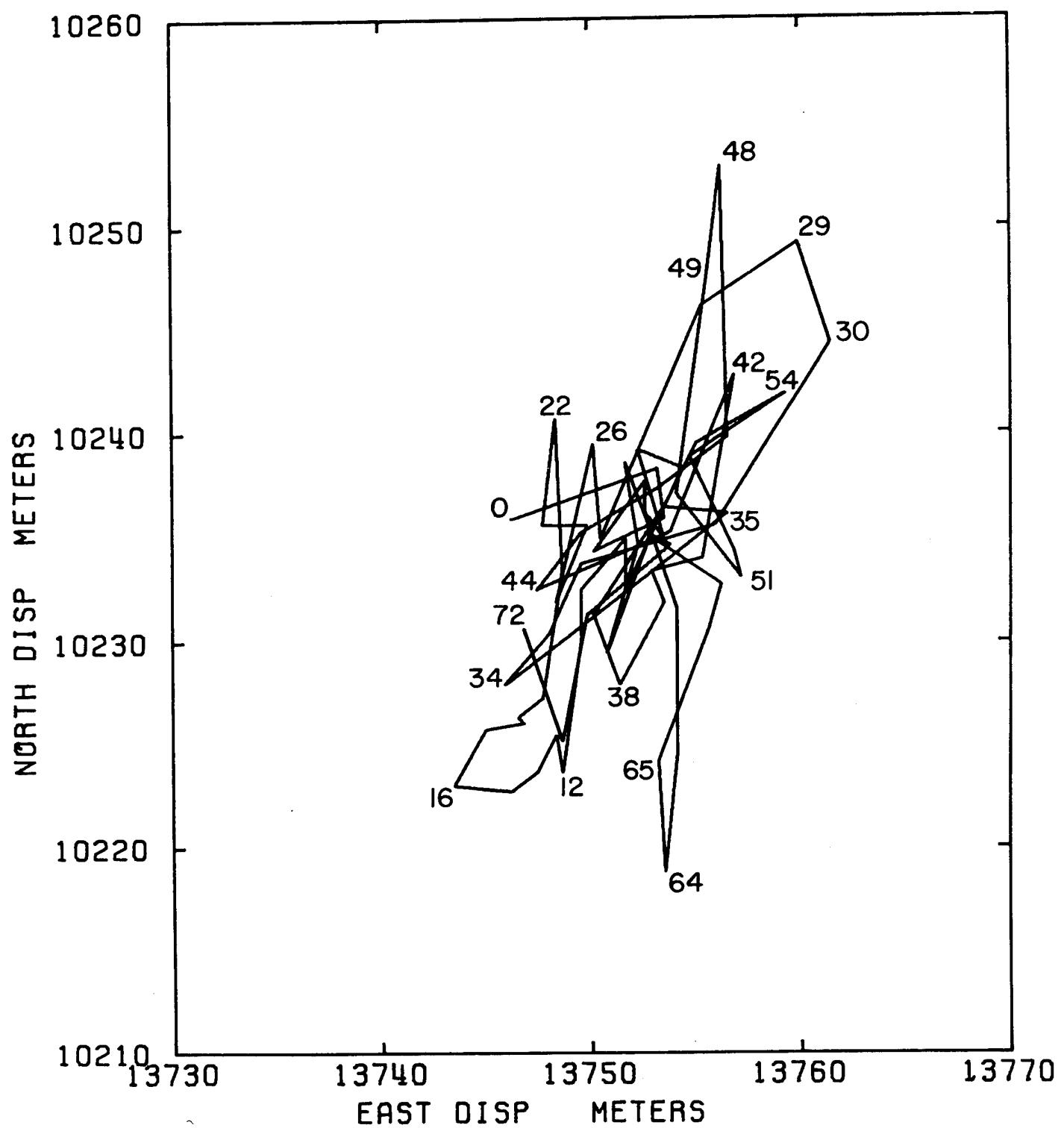


Figure 2. a) A stick plot displacements of pinger from mean position
 b) North displacement from range
 c) East displacement from range
 d) Depth variation



5922A1H
98 M

Figure 3 . A plot of the horizontal movement of the pinger

The range tracked the pinger on the mooring for 72 hours. Figure 2a is a stick plot of the displacement of the pinger from the mean position. The length of each "stick" is proportionate to the displacement of the pinger from its mean position. Its direction indicates the displacement direction. X and Y coordinates for this same time period are also shown in Figure 2b and 2c. Figure 2d shows pinger depth variations over this time span. Figure 3 is a plan view plot of the horizontal movement of the pinger for the first 72 hours. The plotted pinger data is from 1-hour subsampled data series. The numbers on the plot represent hours after launch.

The DSRV ALVIN inspected and photographed the mooring a few days after launch. They reported that the rotor of the bottom current meter was "cocked" in its housing. Upon retrieval the instrument was inspected and found to have a broken rotor pivot bearing. This damage appears to have occurred at launch.

Introduction, Section 2, Current Data

Unlike the preceding volumes this report presents data from a single mooring (Number 592) set by the Buoy Group in February 1976. The purpose and result of the experiment have been discussed in Section 1. This section presents the current meter data from that mooring. There were seven instruments on the mooring line: 6 VACMs and one pinger. The following table lists the instruments and related information.

Table 1

Data Name	Instrument Type	Recording Interval (sec)	Depth (m)	Data Length (Days)	Comments
5921	VACM	56.25	95	32	Good data
5922	Pinger	-	97	3	Tracked by the range
5923	VACM	56.25	144	32	Good data
5924	VACM	56.25	193	32	Good data
5925	VACM	56.25	243	32	Good data
5926	VACM	56.25	292	0	No data on tape
5927	VACM	112.50	950	64	No rotor information Pivot broken at launch

Water depth 972 m

Vector Averaging Current Meter

The Vector Averaging Current Meter (VACM) gathers compass and vane information and computes E and N components each time a pair of rotor magnets pass the sensing diode. These components are summed through the entire recording interval. There are 16 magnets on the rotor so one complete revolution causes eight compute and accumulate cycles. Temperatures are measured by a thermistor whose resistance is converted to frequency and summed over the recording interval. The VACM uses a quartz crystal which oscillates at a frequency of 74.5654 Khz to provide clocking pulses to the instrument. The accuracy of the crystal clock is ± 1 second per day. Time is indicated by placing a clock count value in each data cycle.

Data Processing

The VACM data, recorded on 4 track 1/4" magnetic tape cassettes, were first transcribed onto a computer compatible magnetic tape, then converted to the Maltais format (Maltais, 1969). Data from the top four VACMs were very clean and needed no editing. Data from the lowest VACM had no rotor information. Its only recoverable data were the last compass and vane values from each recording interval and temperature. All five records have had gaps in the time series filled with interpolated values. The maximum number of interpolated points occurred in record 5923 in which 30 data cycles were interpolated in a series 47,824 data cycles long.

Data Presentation

All the data from the four good VACMs plus the partial information from the bottom VACM are displayed in this section following the descriptions for each type of plot. Presentations are as follows:

1. Statistical information
2. Progressive vector diagrams
3. u vs. v scatter plots
4. Spectral diagrams and computer print out
5. Variable vs. time plots. Variables plotted are u, v (north and east current components), direction, speed (both derived from u, v), temperature, instantaneous compass and vane, and bearing (compass + vane)
6. Selected segments of variable vs. time plots with expanded time scales.

Statistics (STATS)

Standard statistical parameters are calculated for data in the time-range given at the bottom of the table. If there are n speed and direction values in a sample, and we define $E_i = S_i \sin \theta_i$, $N_i = S_i \cos \theta_i$, then for A = E, N, and S,

$$\text{mean, } \bar{A} = \frac{1}{n} \sum_{i=1}^n A_i$$

$$\text{variance, } \sigma_A^2 = \frac{1}{n} \sum_{i=1}^n A_i^2 - \bar{A}^2$$

$$\text{standard error of the mean} = \frac{\sigma_A}{\sqrt{n}}$$

$$\text{standard deviation} = \sigma_A$$

$$\text{skewness} = \frac{1}{\sigma^3 A} \left[\frac{1}{n} \sum_{i=1}^n A_i^3 - \frac{3\bar{A}}{n} \sum_{i=1}^n A_i^2 + 2\bar{A}^3 \right]$$

$$\text{kurtosis} = \frac{1}{\sigma^4 A} \left[\frac{1}{n} \sum_{i=1}^n A_i^4 - \frac{4\bar{A}}{n} \sum_{i=1}^n A_i^3 + \frac{6\bar{A}^2}{n} \sum_{i=1}^n A_i - 3\bar{A}^4 \right]$$

The program also calculates "East and North" statistics,

$$\text{covariance}, M = \frac{1}{n} \sum_{i=1}^n E_i N_i - \bar{E} \bar{N}$$

$$\text{standard deviation of covariance}, \sigma_m = \frac{1}{n} \sum_{i=1}^n (E_i N_i)^2 - \bar{(E_i N_i)}^2$$

$$\text{standard error of covariance} = \frac{\sigma_m}{\sqrt{n}}$$

$$\text{correlation coefficient}, M' = \frac{M}{\sigma_E \sigma_N} .$$

The program also calculates parameters related to vector quantities:
the scalar amplitude of the vector mean, $v_m = \sqrt{\bar{E}^2 + \bar{N}^2}$; vector variance,
 $v_v^2 = \frac{1}{2} (\sigma_E^2 + \sigma_N^2)$; standard deviation = v_v .

DATA / 5921856.05

DATA / 5923856.05

```
***** VARIABLE * EAST SPEED TEMPERATURE
NORTH MM/S DEGREES C.
***** VARIABLE * EAST SPEED TEMPERATURE
NORTH MM/S DEGREES C.
***** MEAN * 35.971 117.587 24.746 23.205
STD. ERR. * 6.751 2.75 589E-3 1.859
VARIANCE * 6.38 4.38 3528.549 4.3
STD. DEV. * 9125.411 95.52 1.65E-1 4.364
KURTOSIS * 83.008 4.02 1.129 2.661
SKEWNESS * 3.343 4.783 4.364 KURTOSIS
MINIMUM * 2.781 1.070 0.706 2.34E-1
MAXIMUM * 290.665 19.957 24.003 1.81E-1
298.848 323.518 432.941 25.351 2.95E-1
295.995 275.362 352.576 24.463
```

***** EAST & NORTH

```
***** COVARIANCE * SAMPLE SIZE = 47616 POINTS
STD. DEV. OF COVARIANCE * 3965.846 * NAPTH 2747.438 * SAMPLE SIZE = 47616 POINTS
STD. DEV. OF COVARIANCE * 45.650 * SPANNING RANGE 34.8/8 * SPANNING RANGE
COVARIATION COEFFICIENT * 9961.274 * FRBM 76- 759.773 * SPANNING RANGE
VECTOR MEAN * .500 * TH 76- 111.20 19.00.28 * FROM 76- 11-20 19.00.28
VECTOR VARIANCE * 36.599 * 111.22 18.59.31 * T8 43.300 * TO 76- 111.22 18.59.31
VECTOR STD. DEV. * 8007.867 * DURATION 31.00 DAYS * 6649.672 * DURATION 31.00 DAYS
* 89.487 * DURATION 31.00 DAYS * 81.546 * DURATION 31.00 DAYS
```

DATA / 5924856.05

```
***** VARIABLE * EAST SPEED TEMPERATURE
NORTH MM/S DEGREES C.
***** VARIABLE * EAST SPEED TEMPERATURE
NORTH MM/S DEGREES C.
***** MEAN * 39.889 15.491 92.966 20.724
STD. ERR. * .269 .342 .235E-2 91.831
VARIANCE * 3450.259 5672.033 2210.713 .137E-2
STD. DEV. * 58.739 74.646 47.018 .188
KURTOSIS * 3.53 2.973 3.712 .263
SKEWNESS * -1.44 1.10 .112 .513
MINIMUM * -253.533 248.006 6.845 .514
MAXIMUM * 291.878 306.405 19.294 .508
22.531 1.97E-1 .2808
1.97E-1 .163E-33 .172E-2
.223.441 .203E-351 .663
.223.441 .8E-209 .706E-1
1.9.918 .242.527 .17.617
1.9.918 .242.527 .19.918
```

***** EAST & NORTH

```
***** COVARIANCE * SAMPLE SIZE = 47617 POINTS
STD. ERR. OF COVARIANCE * 695.655 * SPANNING RANGE
STD. DEV. OF COVARIANCE * 25.289 * FROM 76- 76- 76- 840.131 * SAMPLE SIZE = 47616 POINTS
KURTOSIS * 5518.411 * SPANNING RANGE 76- 76- 76- 22.188 * SPANNING RANGE
CHARFULATION COEFFICIENT * 42.015 * TH 74- 111.20 19.00.28 * FROM 76- 76- 76- 481.617 * SPANNING RANGE
VECTOR MEAN * 42.0791 * 111.22 19.00.23 * T8 39.035 * TO 76- 11-22 18.59.31
VECTOR VARIANCE * 4511.146 * DURATION 31.00 DAYS * 4303.129 * DURATION 31.00 DAYS
VECTOR STD. DEV. * 67.165 * DURATION 31.00 DAYS * 65.598 * DURATION 31.00 DAYS
```

DATA / 5927A112•5

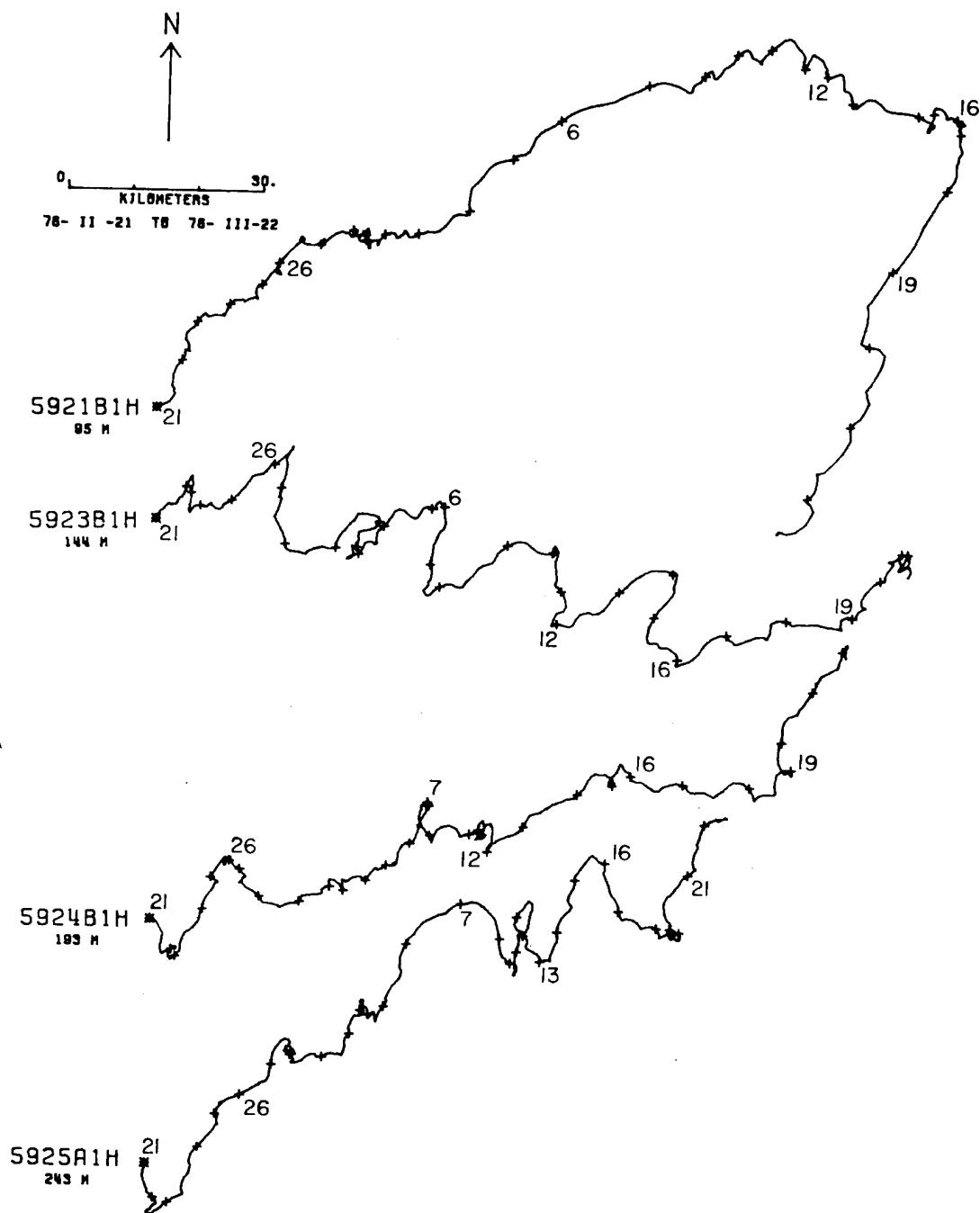
* VARIABLE * TEMPERATURE
* UNITS * DEGREES C.

MEAN = 5.585
STD. ERR. = 4.50E-3
VARIANCE = 1.01E-1
STD. DEV. = 1.00
KURTOSIS = 3.152
SKEWNESS = 9.07E-1
MINIMUM = 5.209
MAXIMUM = 5.917

* SAMPLE SIZE = 49569 POINTS
* SPANNING RANGE
* FREQ 76 II -20 19.00 .56
* T9 76 IV -25 08.00 .56
* DURATION 64.54 DAYS

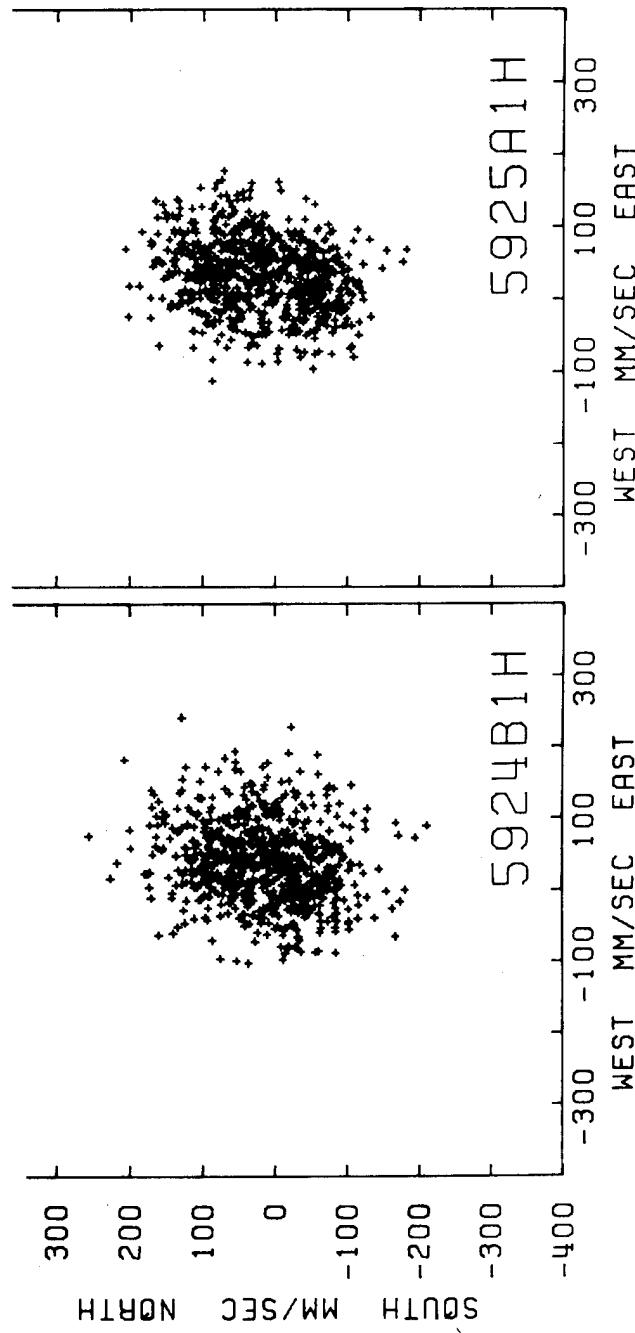
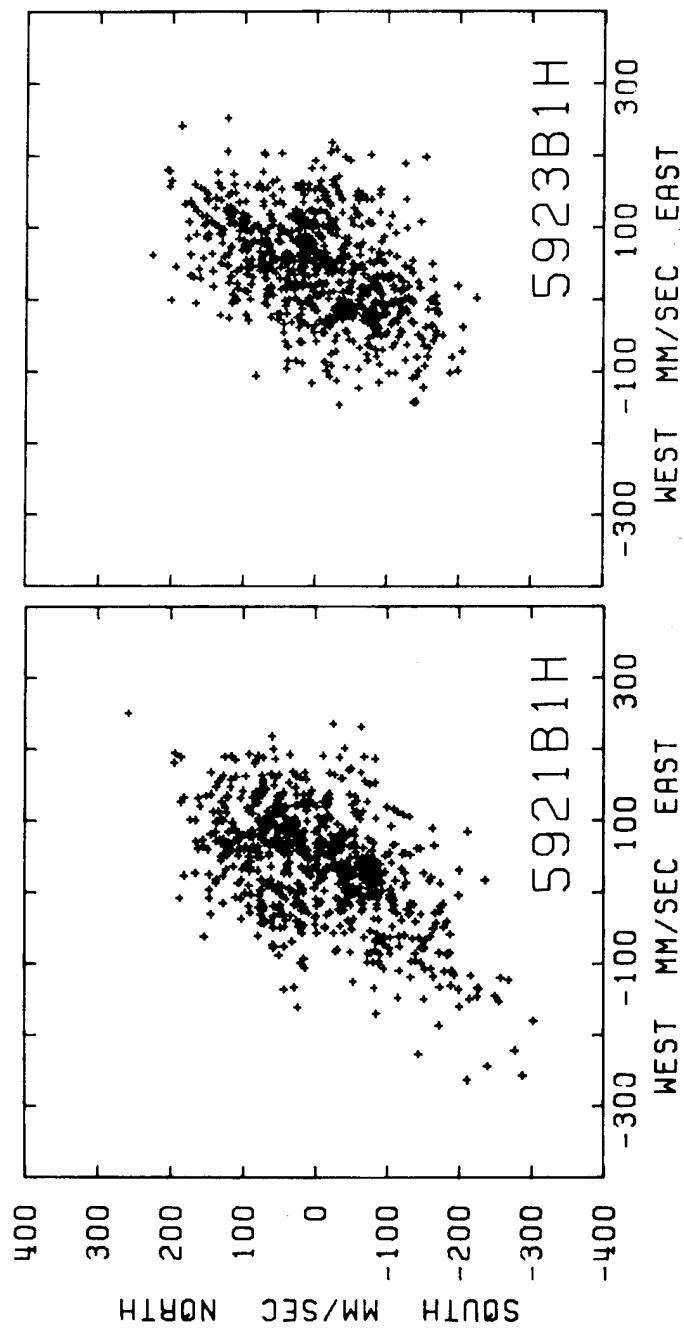
Progressive Vector Diagram (PROVEC)

The EAST and NORTH progressive displacements are computed from two hour vector averages. The plot begins with an asterisk (*) on 76-02-20 19.00.28. All following day boundaries are indicated with a plus (+). This type of plot accentuates very low frequency events at the expense of higher frequency oscillations which may be hidden by a large amplitude low-frequency current.



Scatter Plots

The 1 hour averaged u and v components are plotted against each other to display the vector coordinates. This type of plot shows general data trends and velocity extrema.



Spectra and Cross-Spectra

Program TIMSAN (TIME Series ANalysis) is used to calculate all spectral quantities; the Fast Fourier Transform routine of Singleton (1969) is the basic algorithm.

The autospectra shown are from records which have been broken into 9 segments of 5000 points each; additionally, the East, North, and Temperature autospectra are cosine windowed (Hanning) and 50% overlapped. Spectral estimates are obtained by ensemble-averaging across the segments.

Each autospectrum has a lowest-frequency estimate of $64/5000 = 0.0128$ cph, and a Nyquist frequency of 32 cph. The spectra are frequency-band averaged to further increase stability, at the expense of frequency resolution. The averaging algorithm is:

first forty points	- average	1	frequency
next thirty points	- average	2	frequencies
next thirty points	- average	5	frequencies
next 400 points	- average	10	frequencies
next 300 points	- average	20	frequencies
next 300 points	- average	50	frequencies
next 4000 points	- average	100	frequencies.

Since each spectrum contains only 2500 estimates before band averaging, the plotted results display only 136 points, the first 40 of which are based on one frequency band each, the last 14 of which are based on 100 frequency bands each.

The spectra are "one-sided", i.e., the area under the spectrum, for positive frequencies only, equals the variance of the original data. The variance loss due to the cosine window is accounted for by multiplying each spectral estimate by 8/3.

Table 2 is a matrix of Page Numbers for each depth-variable pair; "CW" is the clockwise rotary spectrum, "CCW" the counter-clockwise rotary spectrum, "Total" the spectrum of horizontal kinetic energy, i.e., the sum of CW and CCW (c.f., Gonella, 1972).

Table 2
Page Numbers for
Auto-Spectra

	East	North	Temperature	CW	CCW	Total
95 m	21	29	37	49	51	47
144 m	23	31	39	55	57	53
193 m	25	33	41			
243 m	27	35	43			
950 m			45			

Confidence limits for the autospectra depend upon whether the data segments were windowed and overlapped or not, and on how much frequency-band averaging has occurred. Table 3 gives the 95% confidence limits; the number in parenthesis following the confidence limit is the number of equivalent degrees of freedom in the estimate.

Table 3
95% Confidence Limits for
Autospectra Estimates

Frequency Band (cph)	East, North Temperature (windowed, overlapped)	CW, CCW, Total
0.0128 - 0.512	0.66 - 1.71 (34.4)	0.57 - 2.19 (18)
0.5248 - 0.8960	0.69 - 1.58 (46.2)	0.66 - 1.69 (36)
0.9088 - 1.280	0.76 - 1.37 (91.7)	0.76 - 1.37 (90)
1.2928 - 6.400	0.82 - 1.25 (171.5)	0.82 - 1.24 (180)
6.4128 - 10.240	0.86 - 1.17 (332.3)	0.87 - 1.16 (360)
10.2528 - 14.080	0.91 - 1.10 (815.6)	0.91 - 1.10 (900)
14.0928 - 32.000	0.93 - 1.07 (1624.5)	0.94 - 1.07 (1800)

Cross-spectra are shown only for the upper pair of instruments (95 m and 144 m). Table 4 shows which variable pair is given on which page. The cross-spectra are plotted as coherence (modulus of the complex cross-spectrum) and phase (arctangent of the ratio of quadrature spectrum to co-spectrum). The same logarithmic frequency-band averaging scheme

as used for autospectra has been used on the cross-spectra prior to calculating coherence and phase. In addition, each cross-spectrum has been calculated twice: once with the same resolution and averaging as for the autospectra, and once with data segments of only 640 points which gives more segments to average over and hence increased statistical reliability, at the expense of low-frequency resolution.

Table 4

<u>Page Numbers</u>	
<u>for Cross-Spectra</u>	
(95 m vs 144 m)	
East-East	59
North-North	61
Temperature-Temperature	63

The 95% confidence levels for the hypothesis of zero true coherence (i.e., the level below which 95% of the estimates would fall if the two records were truly incoherent) are given in Table 5.

Table 5

<u>95% Confidence Levels</u>		
<u>on Zero True Coherence Hypothesis</u>		

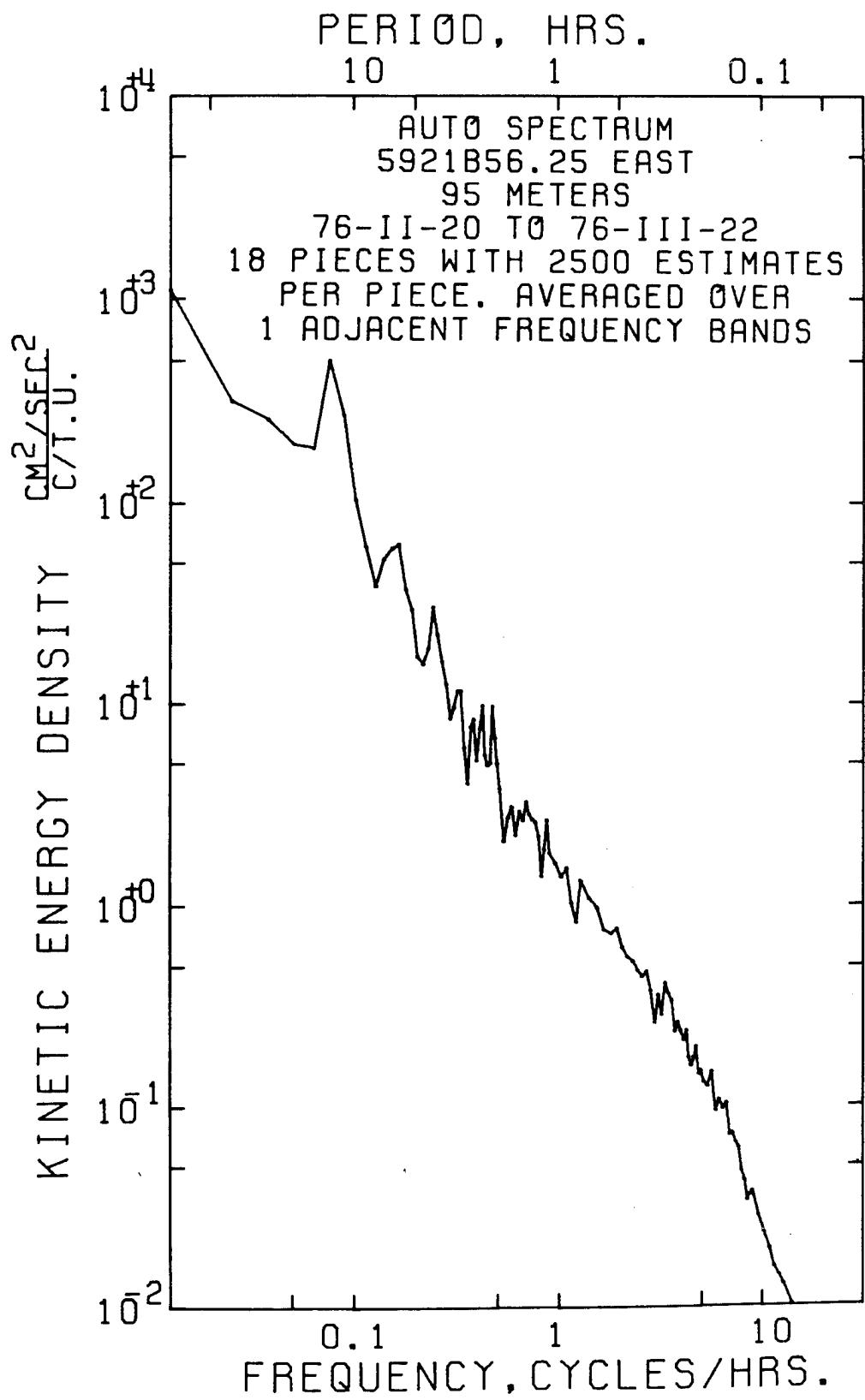
No. of Points in Data Segment	Frequency Band (cph)	95% Confidence Level
5000	0.0128 - 0.512	0.411
	0.5248 - 0.8960	0.356
	0.9088 - 1.280	0.254
	1.2928 - 6.400	0.186
	6.4128 - 10.240	0.134
	10.2528 - 14.080	0.086
640	14.0928 - 32.00	0.061
	0.10 - 4.00	0.146
	4.10 - 7.00	0.126
	7.10 - 10.00	0.089
	10.10 - 32.00	0.065

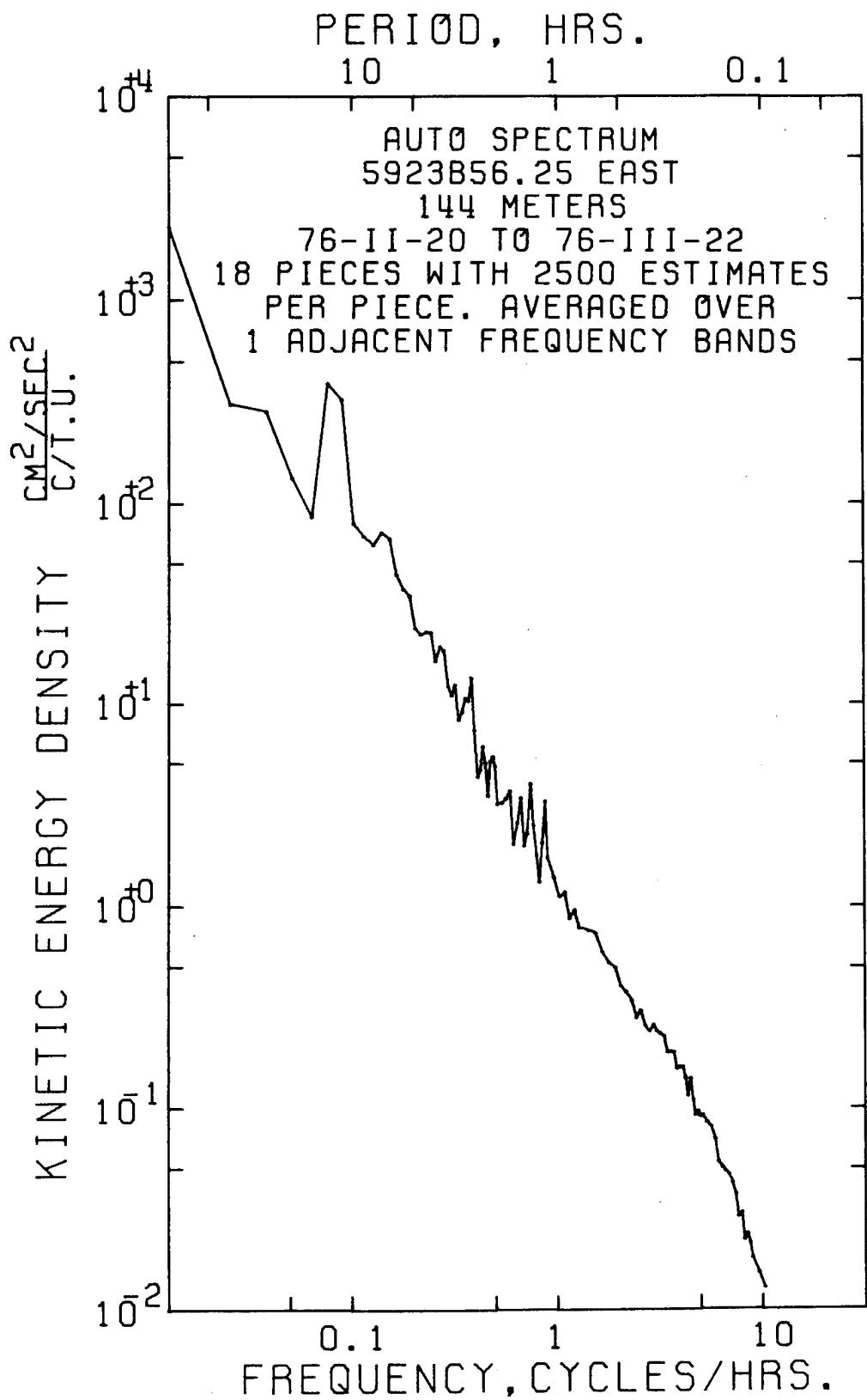
It would be inappropriate to accept as meaningful any phase estimate corresponding to a coherence estimate falling below the 95% confidence level. For those few acceptable phase estimates, 95% confidence limits may be estimated as

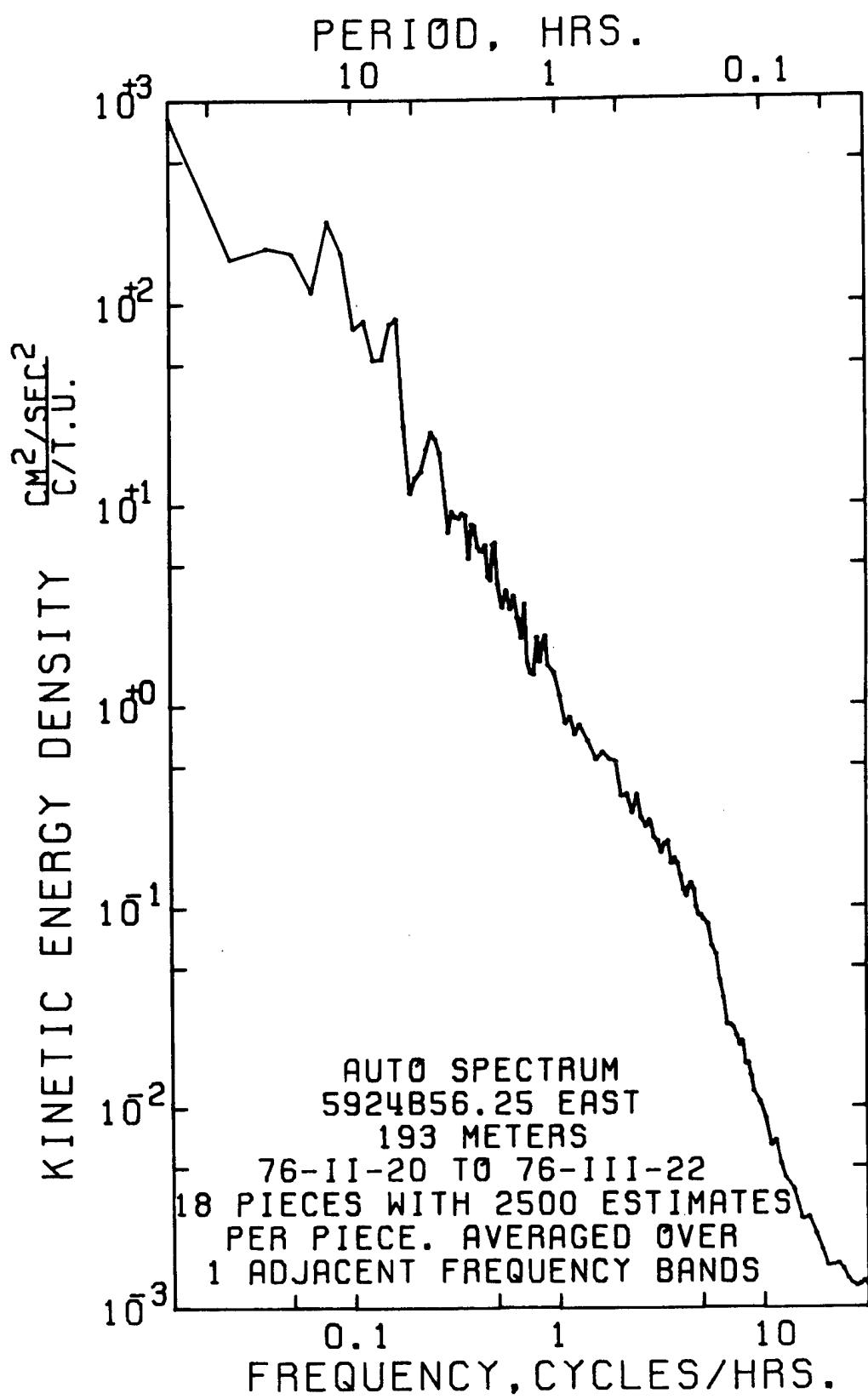
$$\pm \Delta\phi = \text{arc sin } (t_v \left(\frac{1 - \gamma^2}{v\gamma^2} \right)^{\frac{1}{2}})$$

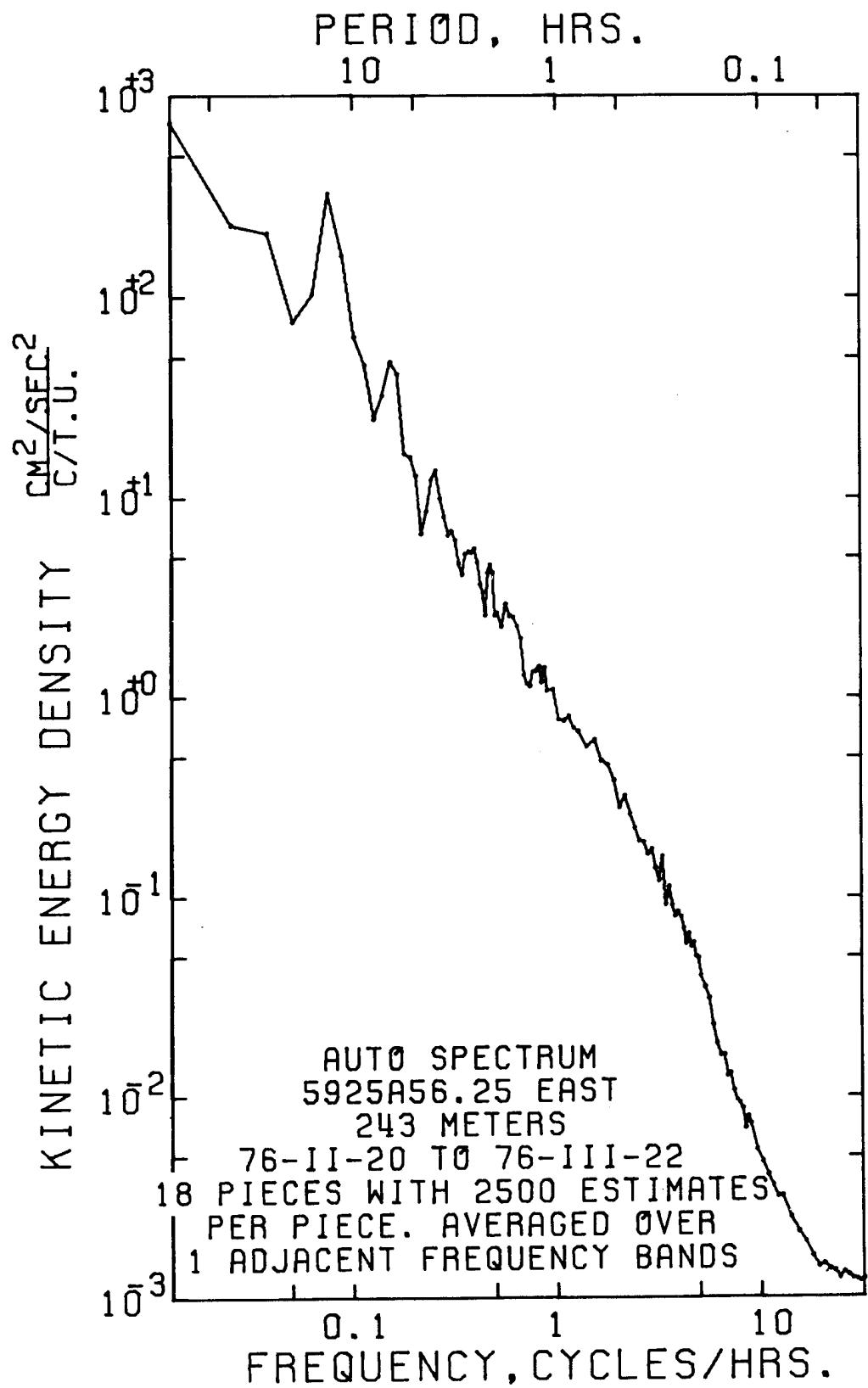
where $t_v = 1.96 + 2.38/v + 2.64/v^2 + 2.56/v^3$, γ is the acceptable coherence estimate, and v is the equivalent number of degrees of freedom for the estimate. For the higher-resolution, lower-stability cross-spectra (upper part of each figure), the v value is given in Table 3 for the windowed, overlapped case. For the lower-resolution, higher-stability cross-spectra, the v value is 8.15 times larger, for each frequency band. Note that for $v > 23$, i.e., all the estimates given here, $t_v = 1.96$ to better than 5%. For example, in the lower part of the Temperature-Temperature coherence (page 63) at cph is 0.25, which implies it is acceptable non-zero. The phase confidence limits are thus 22° which means that the phase at 0.3 cph is statistically indistinguishable from zero.

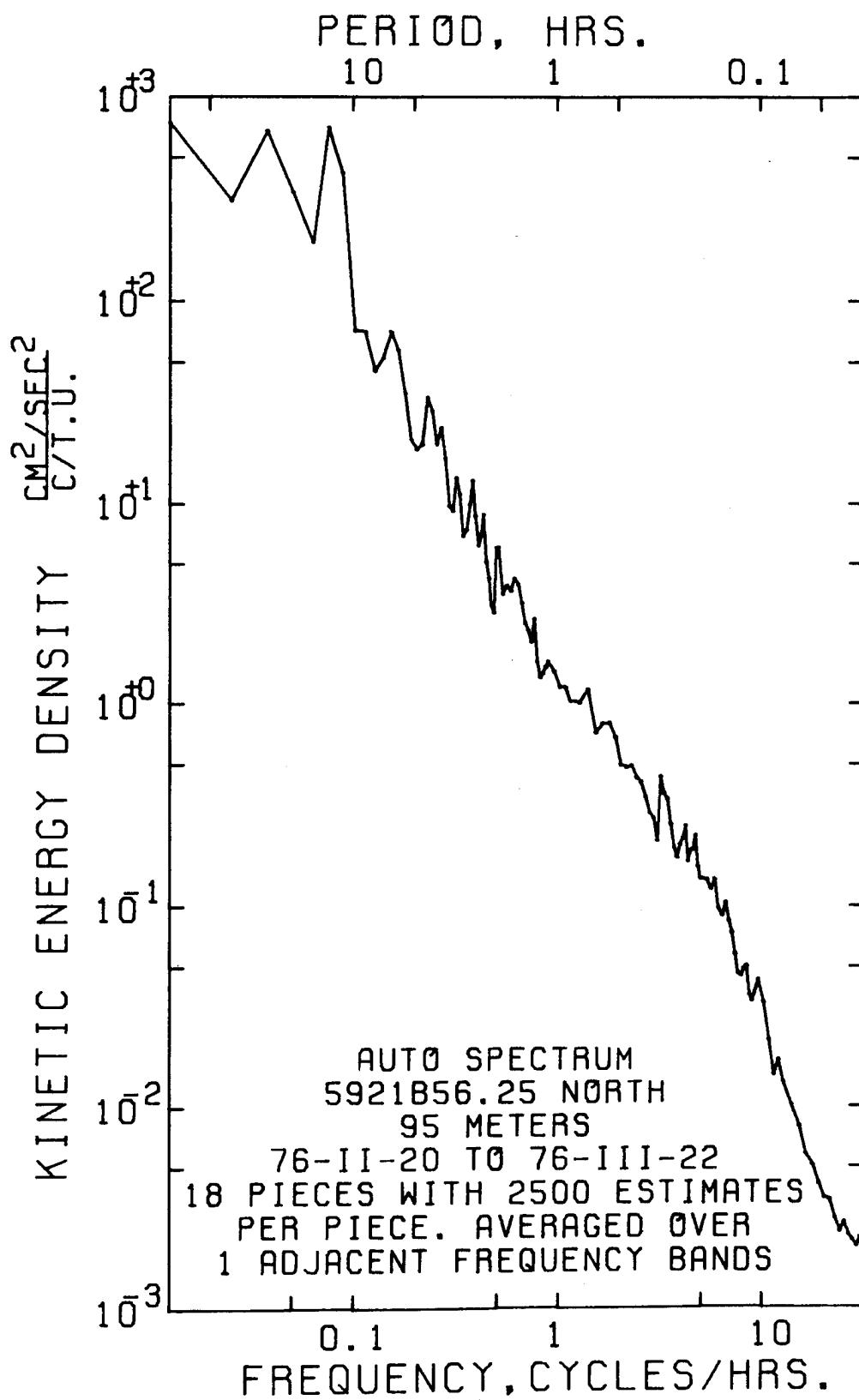
A set of cross-spectral quantities is provided, page 64, but they are not plotted. These are the rotary (i.e., vector) coherences between the 95 m and 144 m current measurements; only the results up to 4 cph are given. For completeness computer output is also included from the 95 m and 144 m (pages 70, 76 respectively) rotary autospectral results: of particular interest are the quantities such as rotary coefficient, ellipse orientation and stability, and mean ellipse orientation.

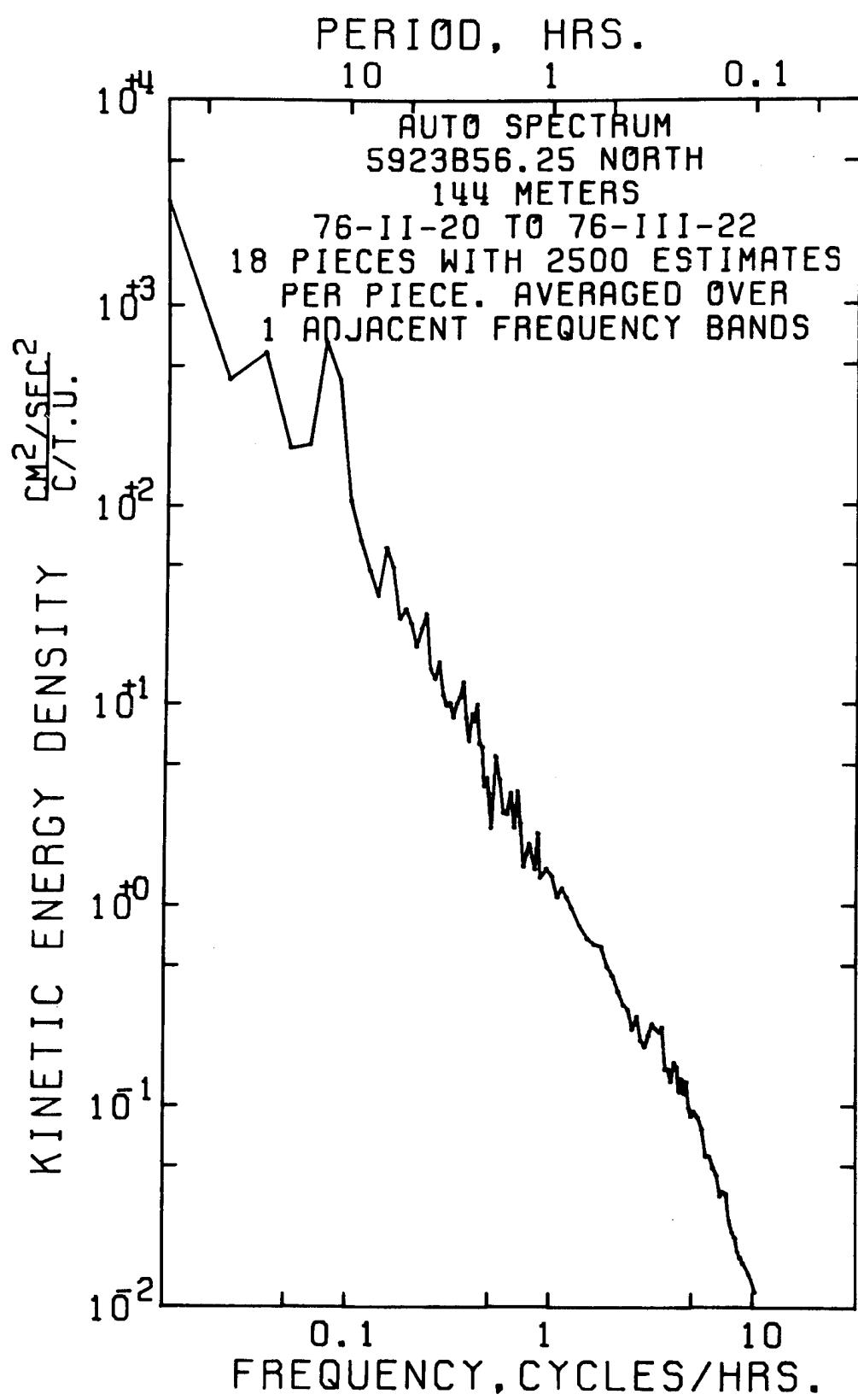


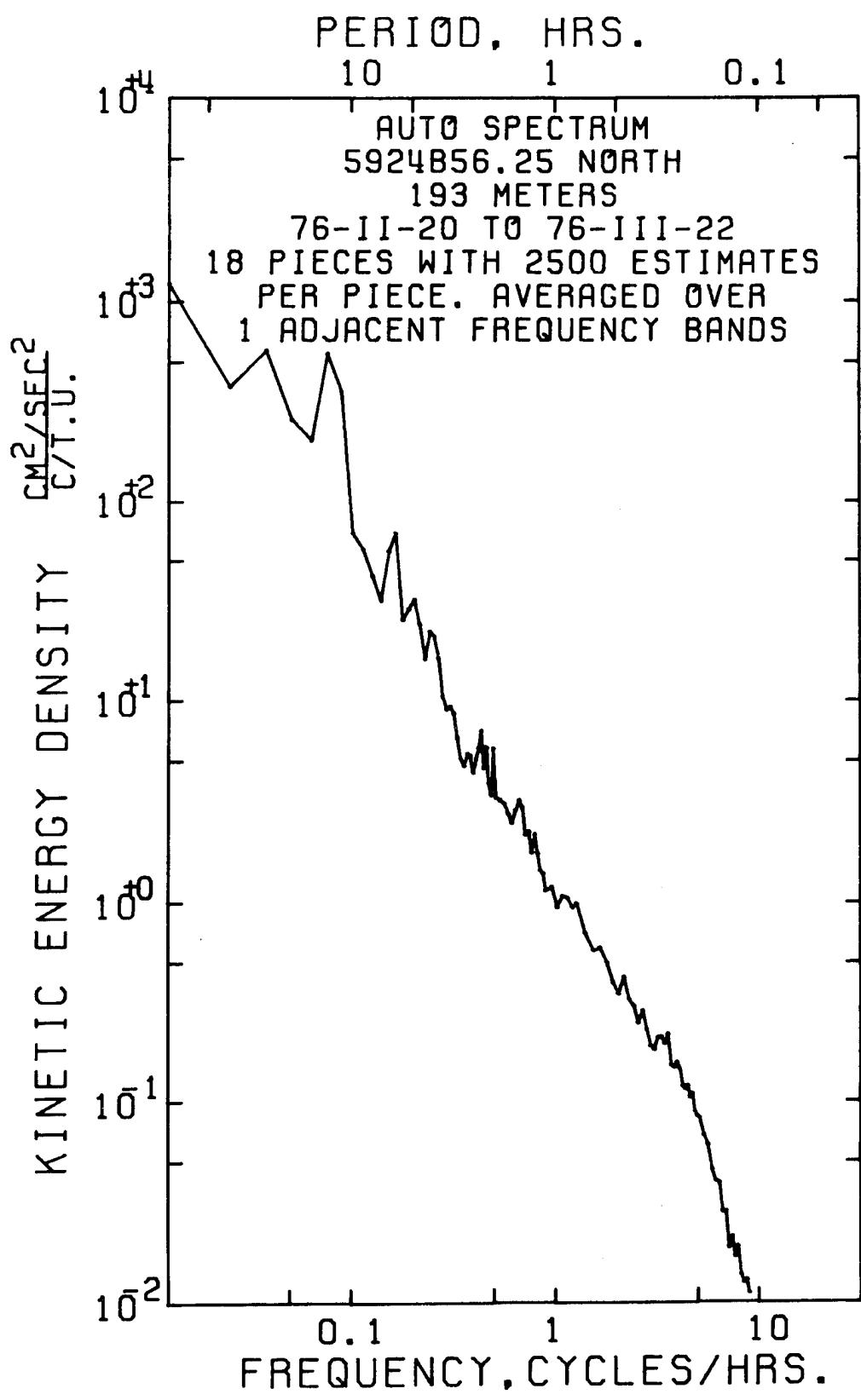


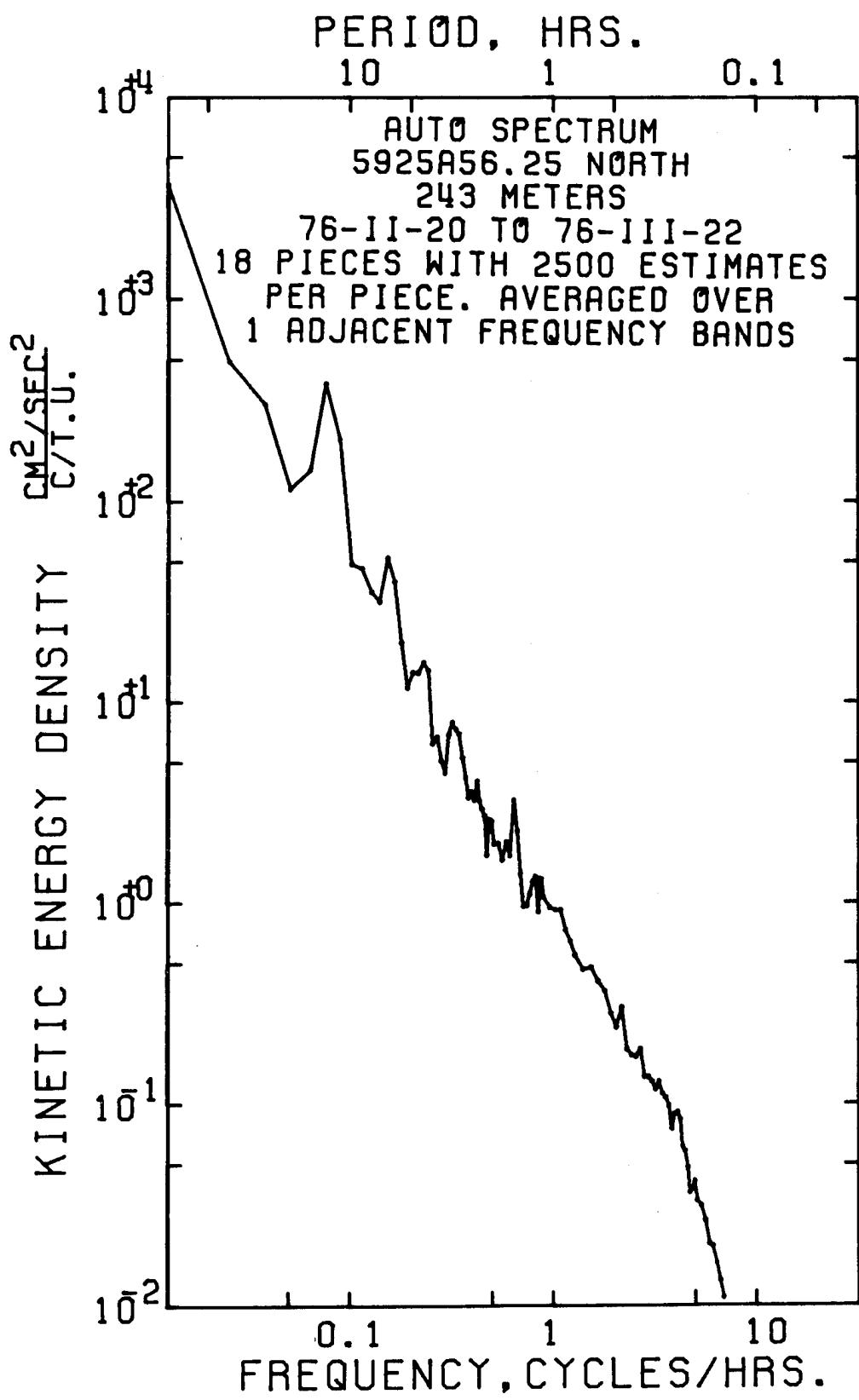


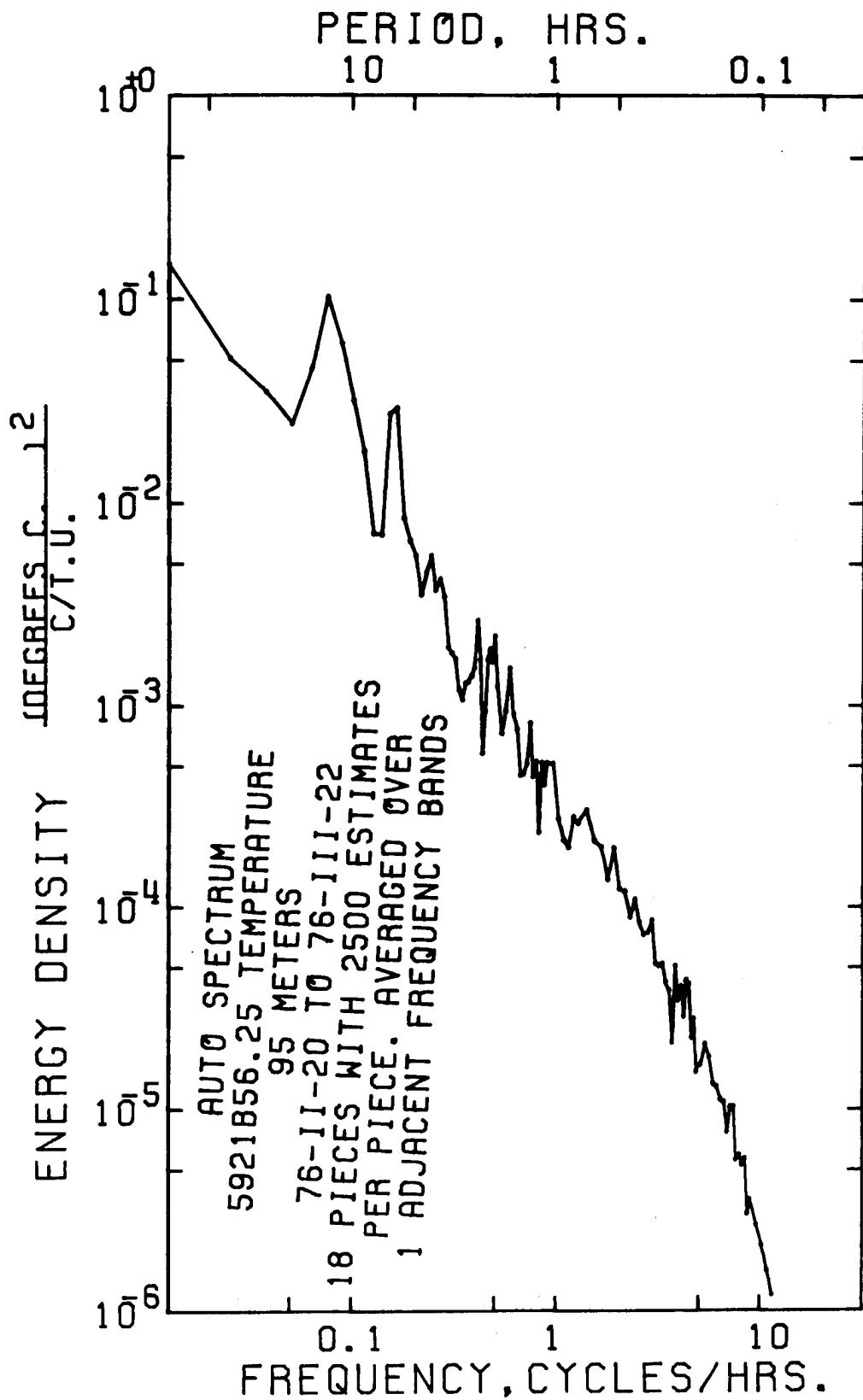


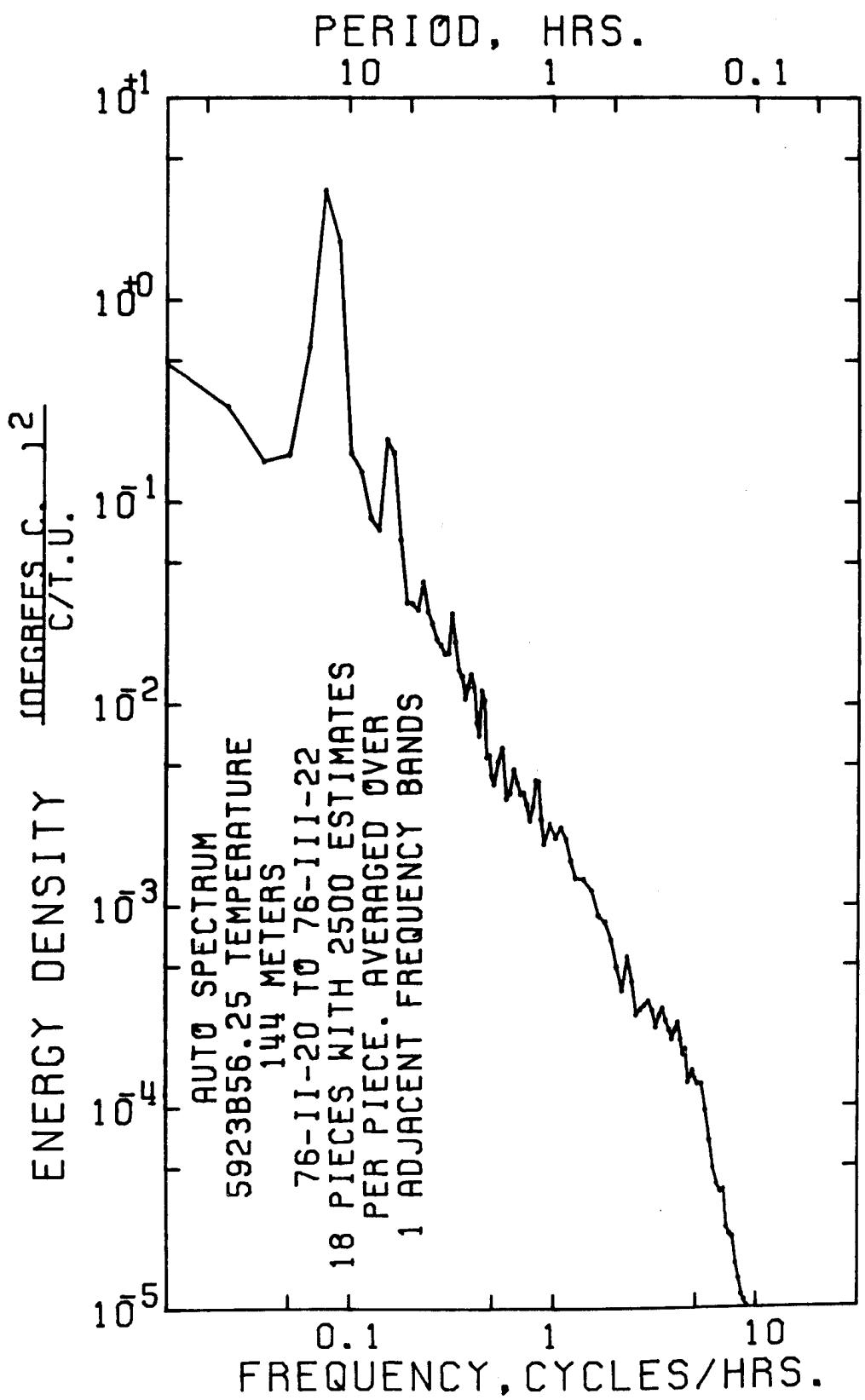


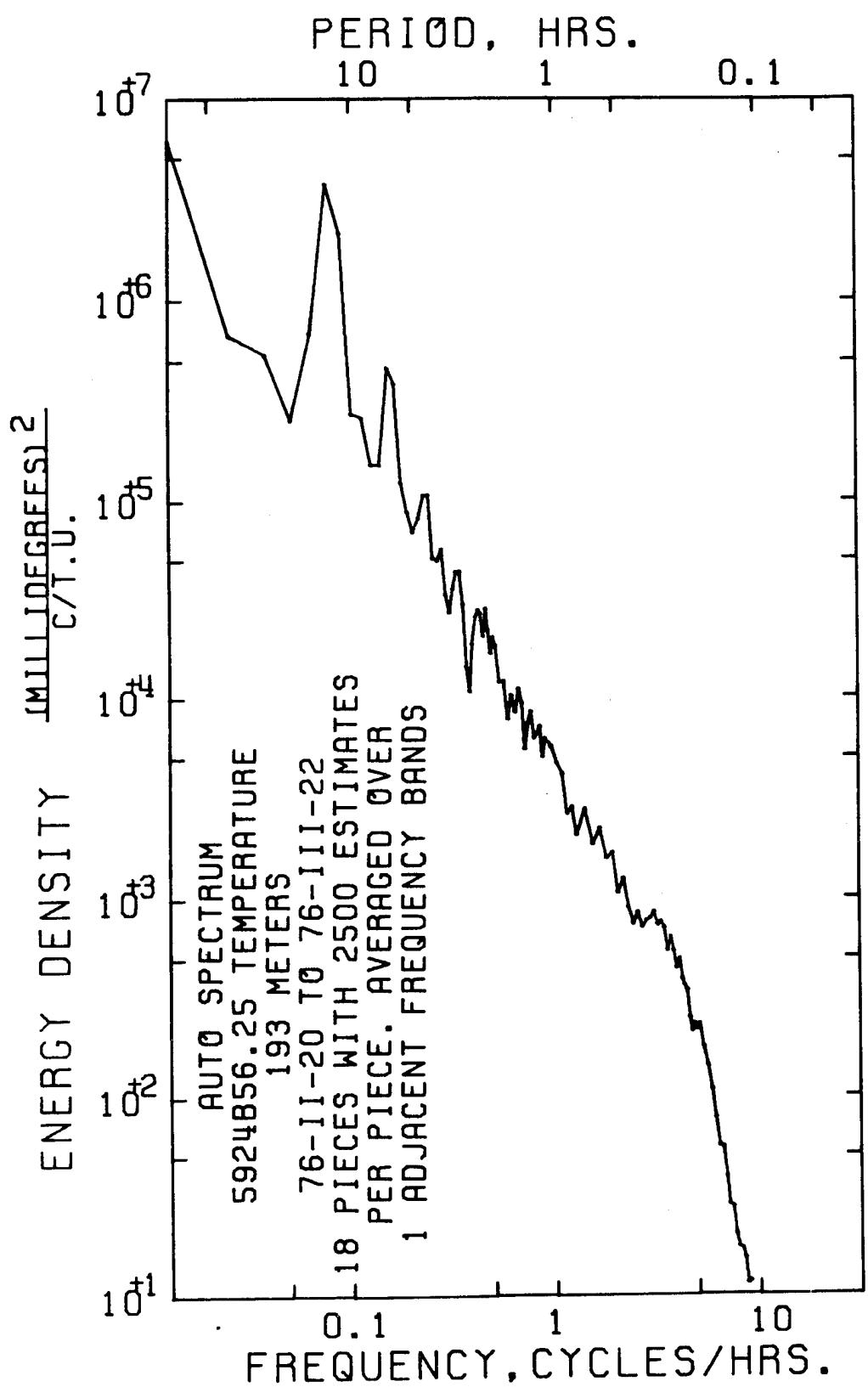


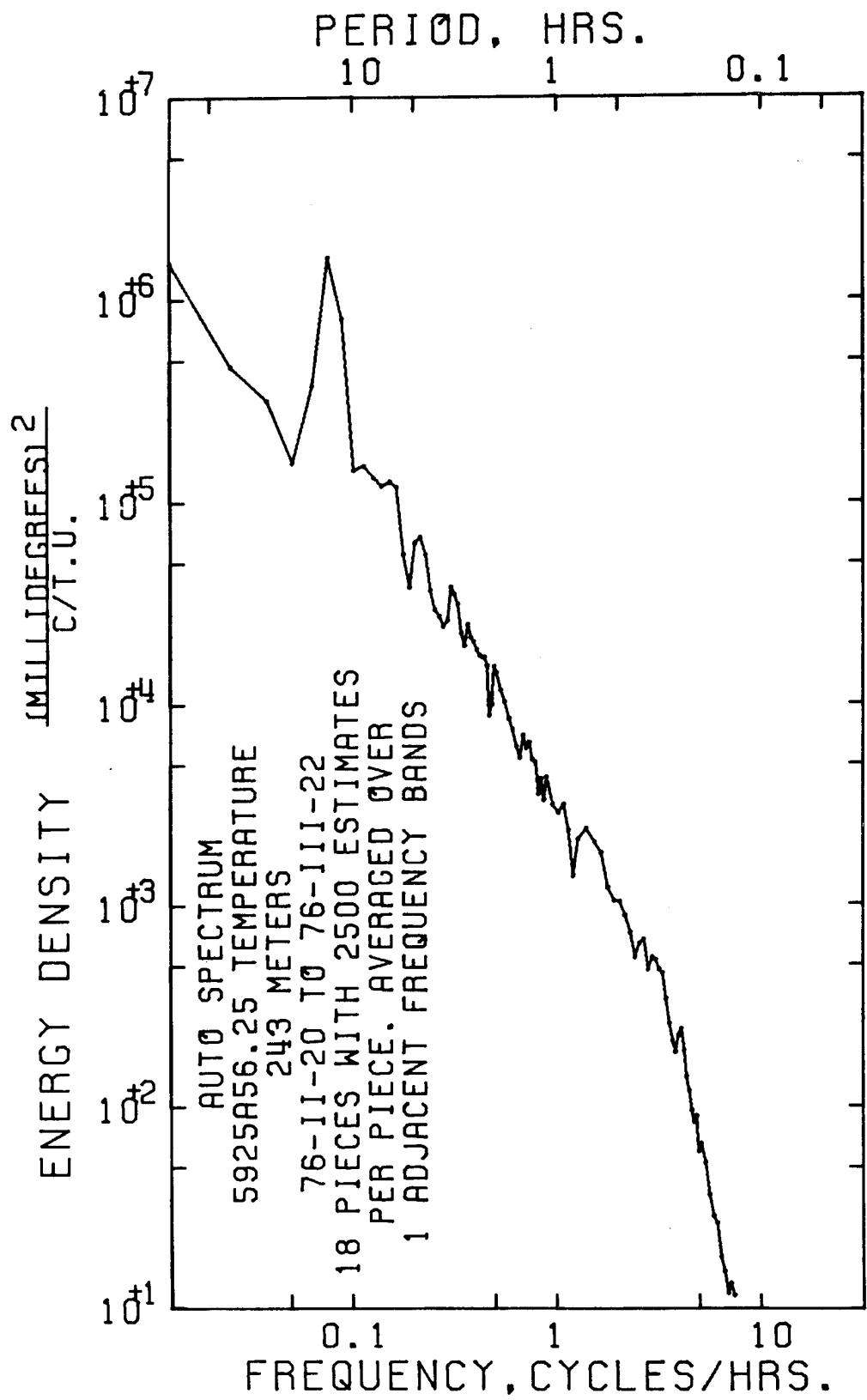


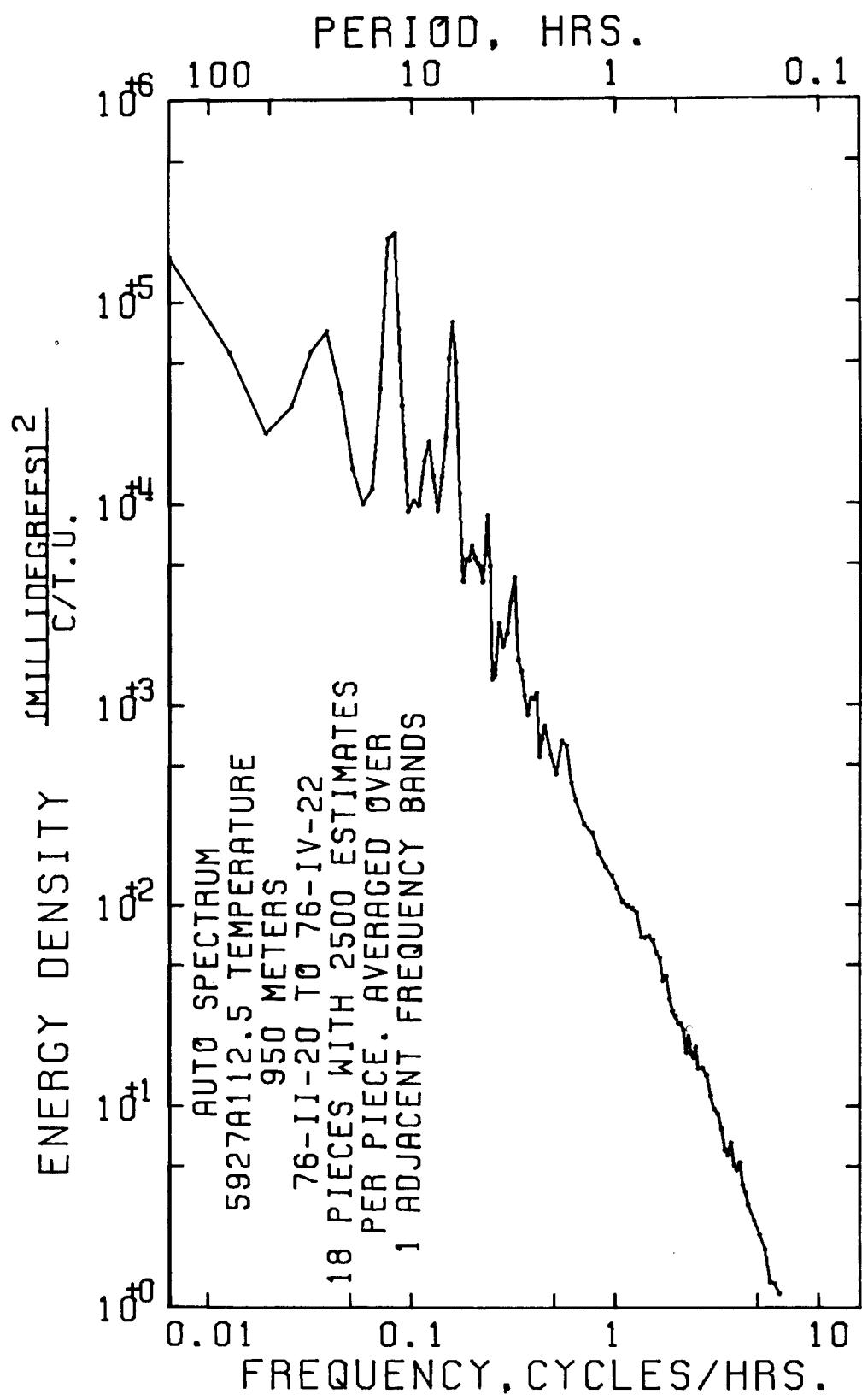


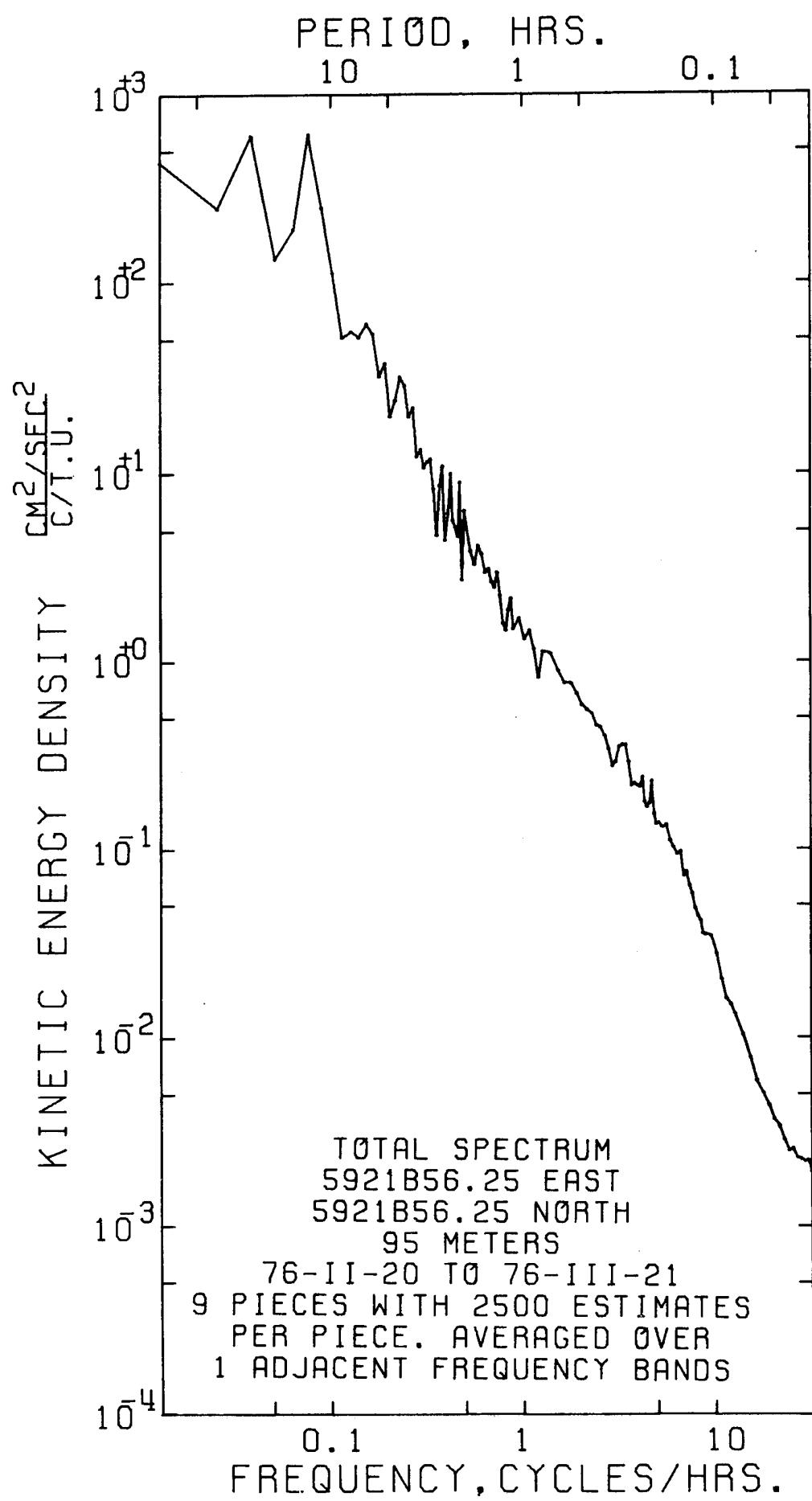


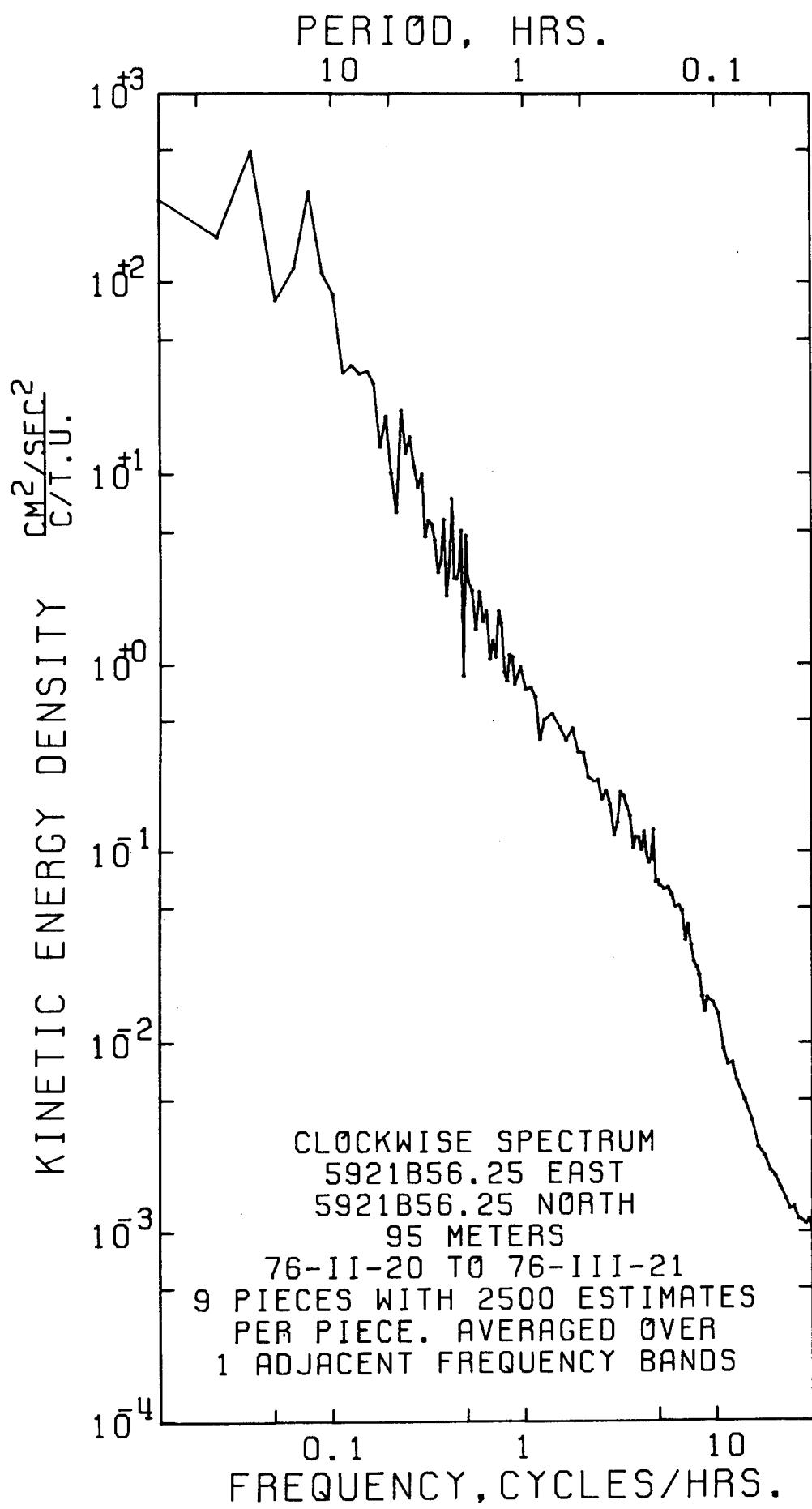


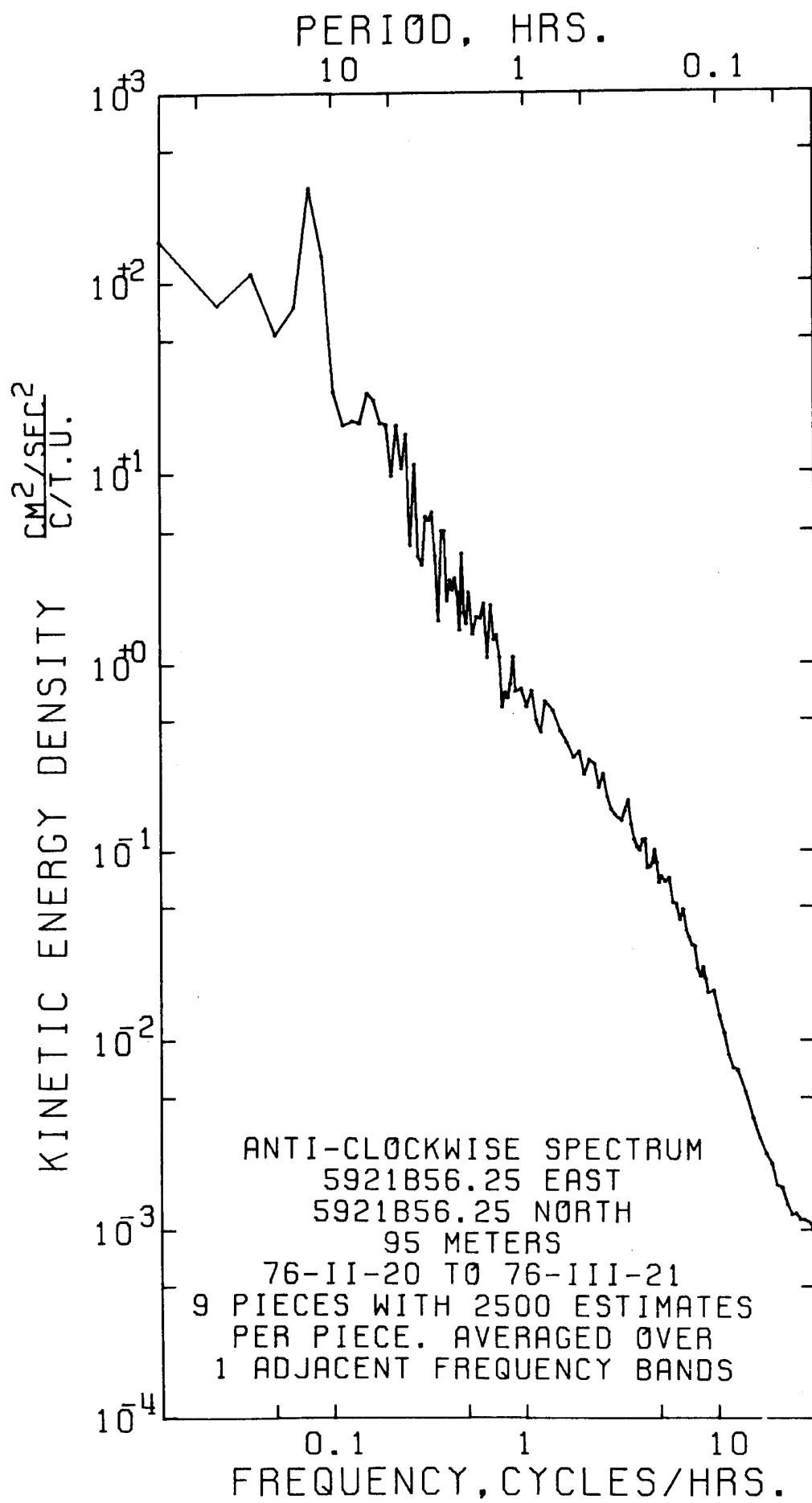


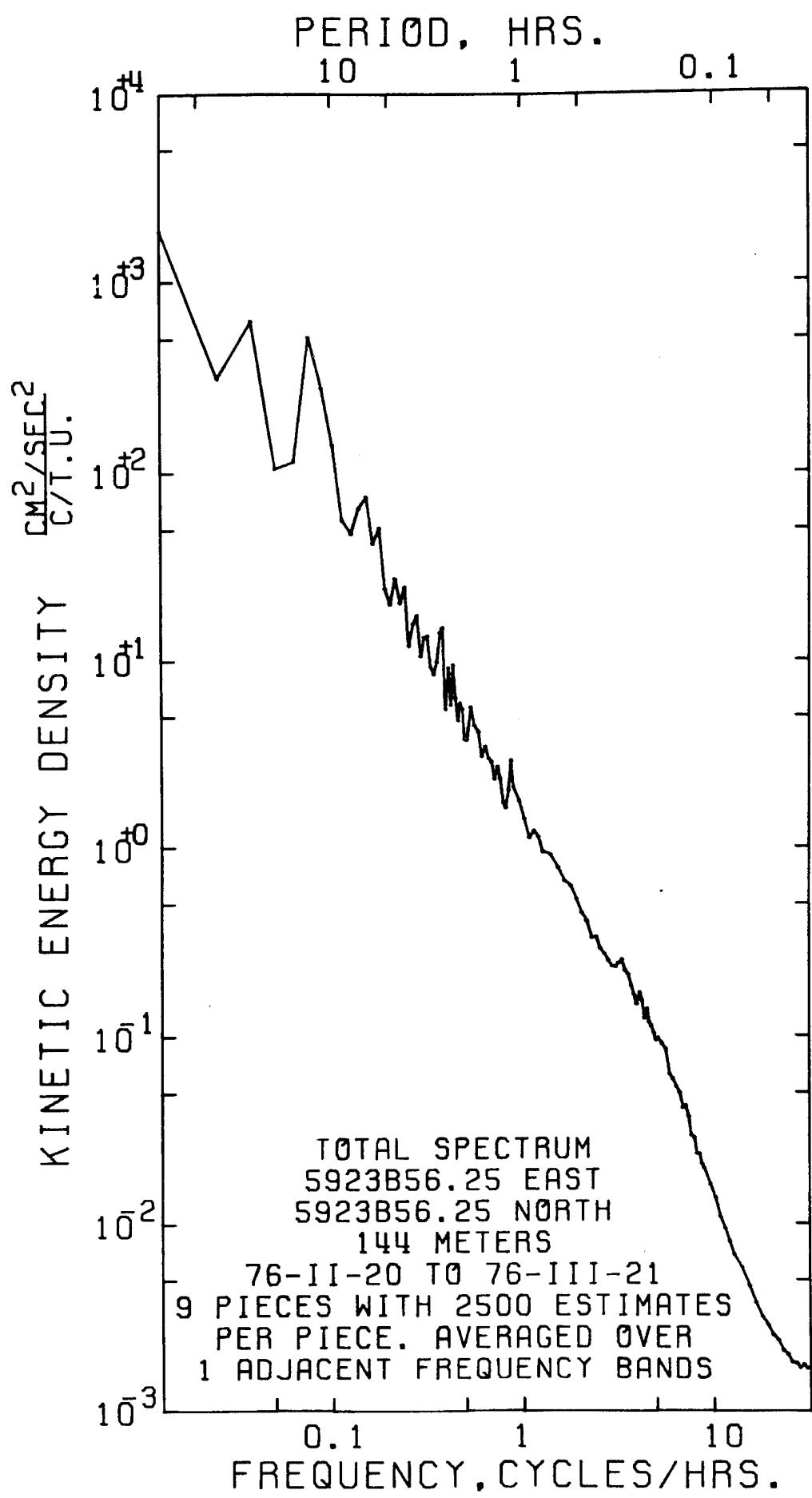


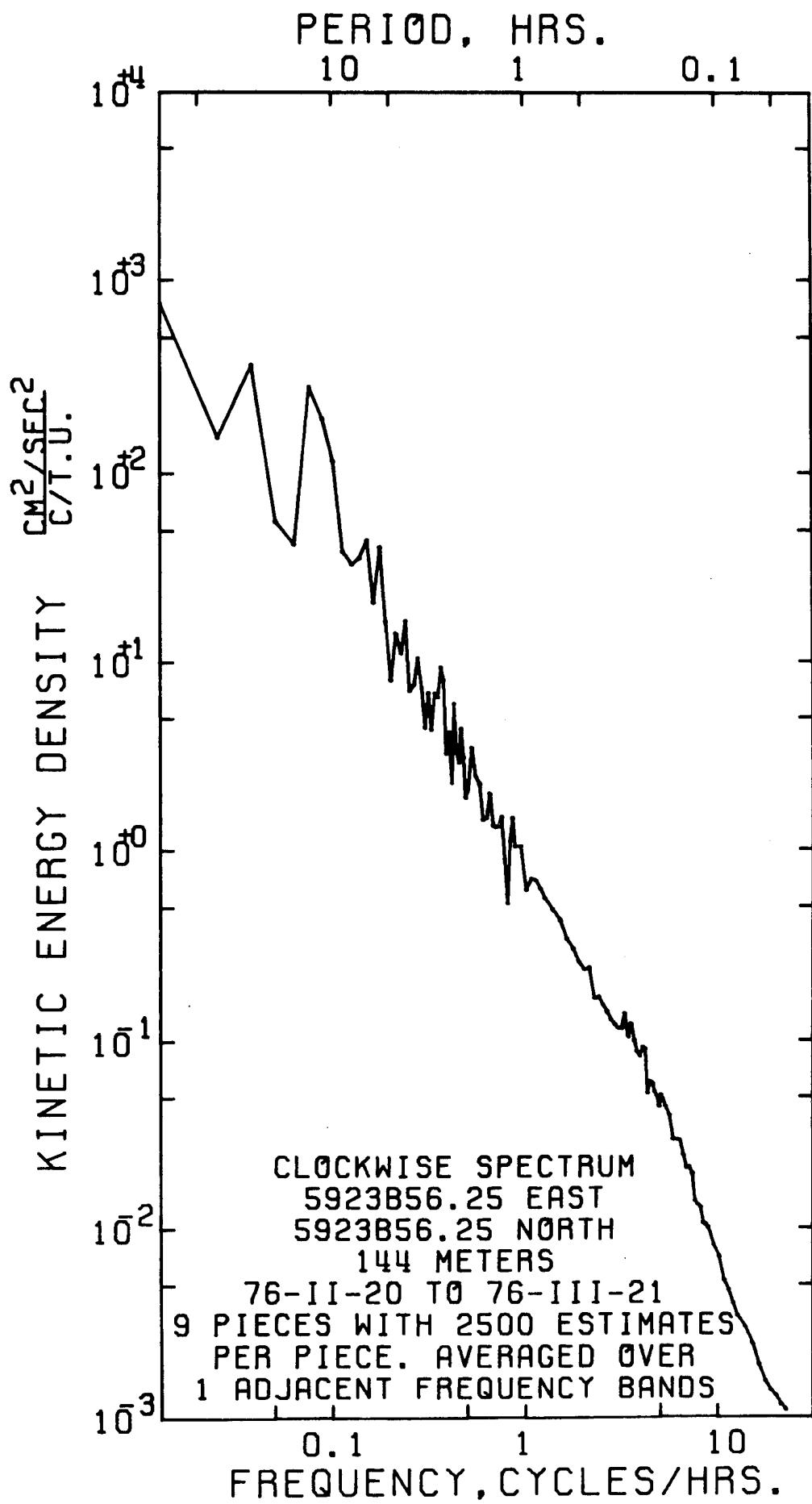


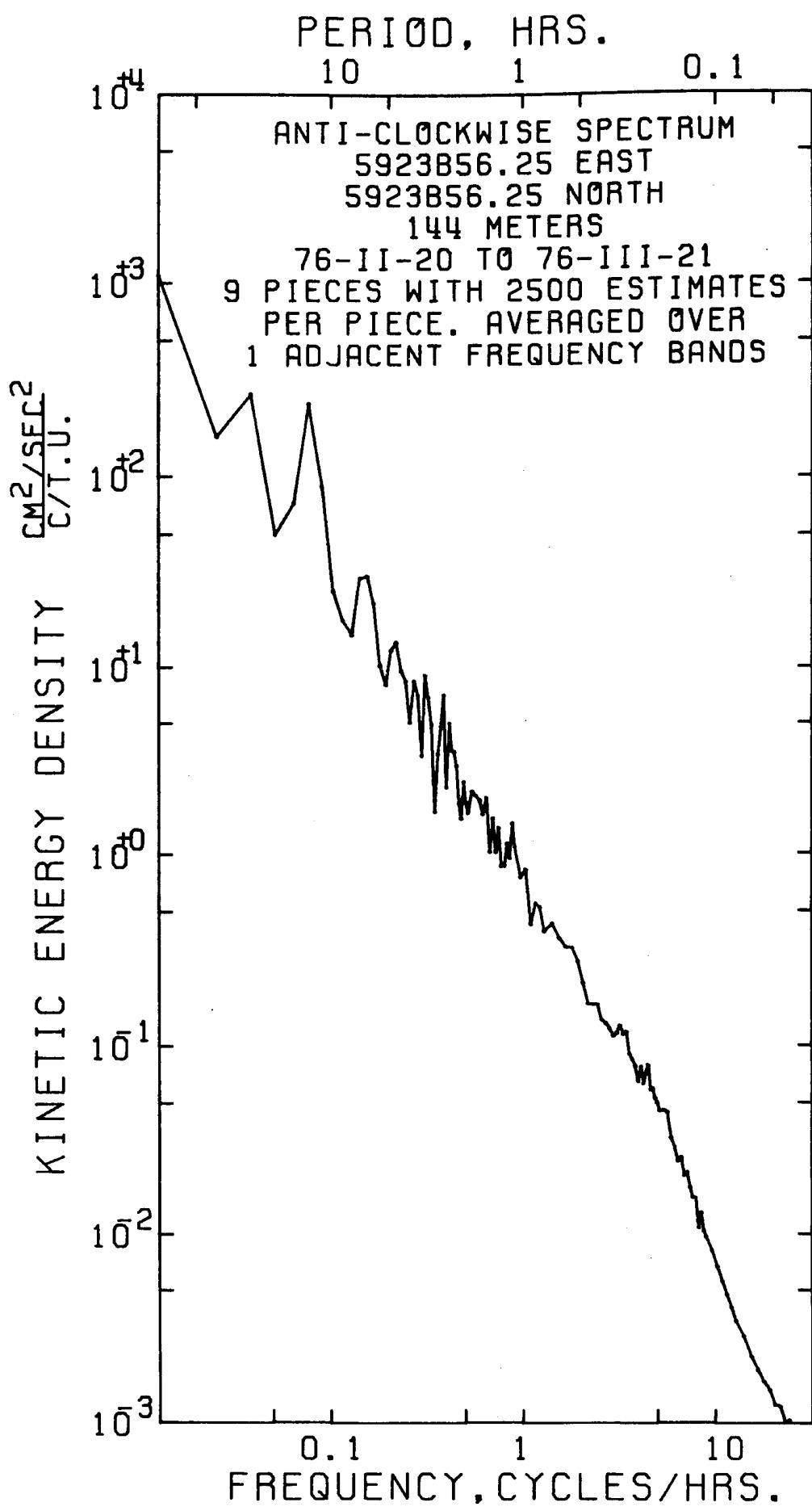


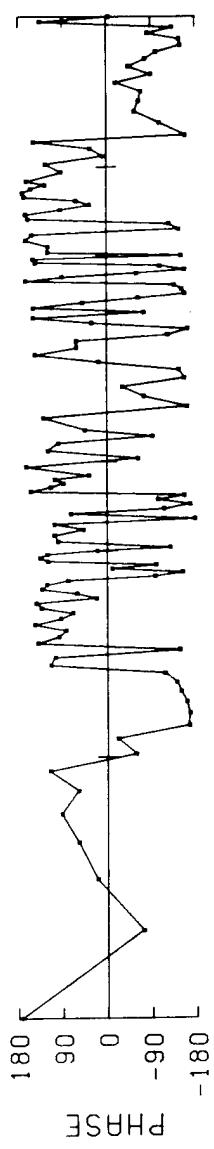




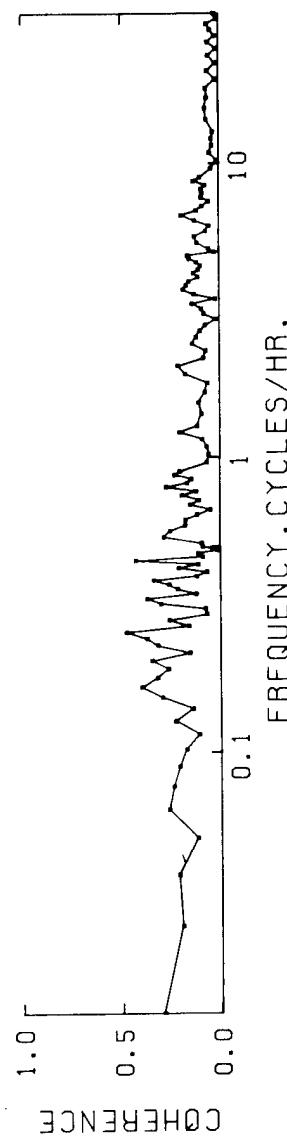




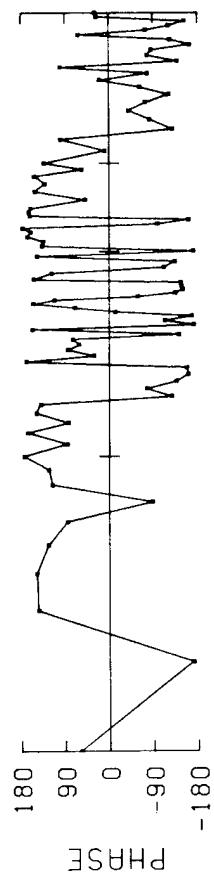




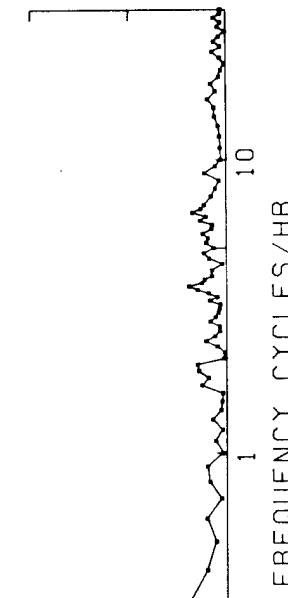
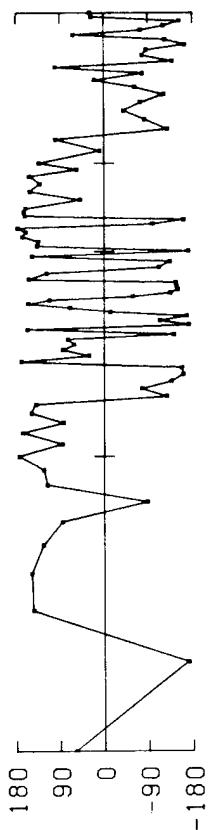
CROSS-SPECTRUM
5921B56.25 EAST
5923B56.25 EAST
76-11-20 TO 76-11-22
18 PIECES WITH 2500 ESTIMATES
PER PIECE. AVERAGED OVER
1 ADJACENT FREQUENCY BANDS



FREQUENCY, CYCLES/HR.

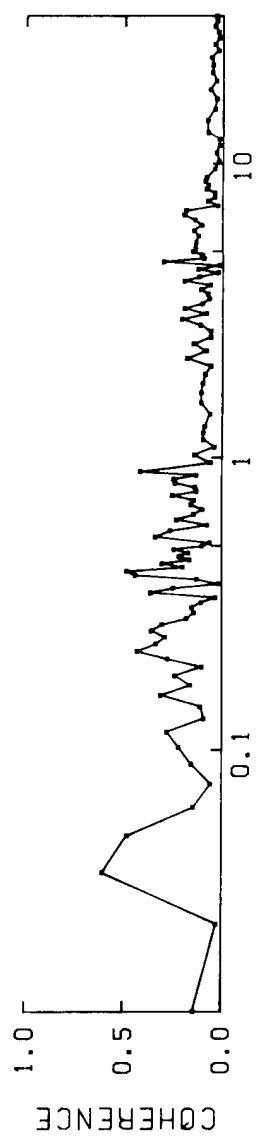
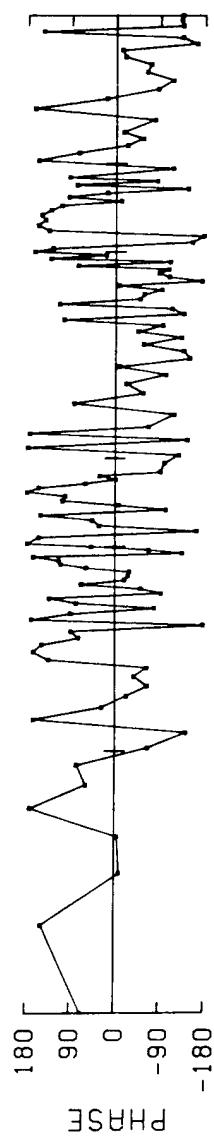


PHASE

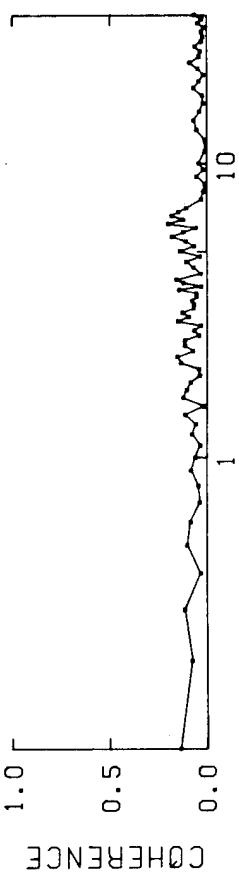
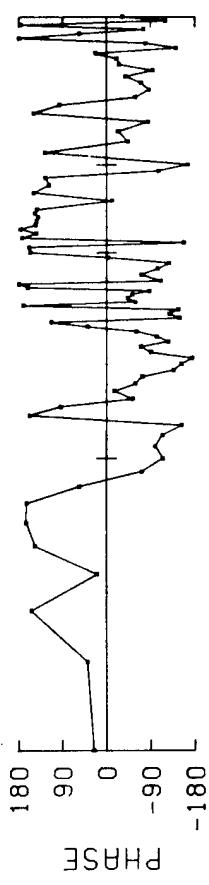


FREQUENCY, CYCLES/HR.

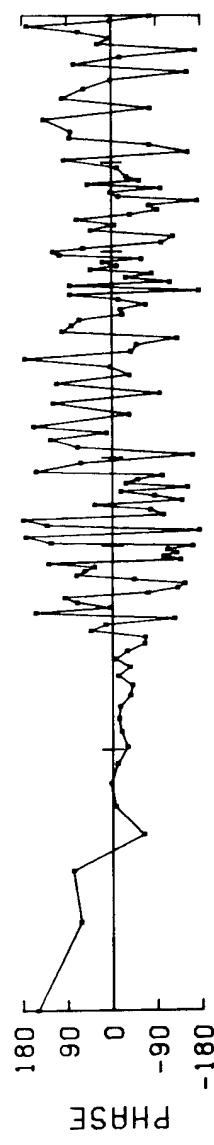
CROSS-SPECTRUM
5921B56.25 EAST
5923B56.25 EAST
76-11-20 TO 76-11-22
148 PIECES WITH 320 ESTIMATES
PER PIECE. AVERAGED OVER
1 ADJACENT FREQUENCY BANDS



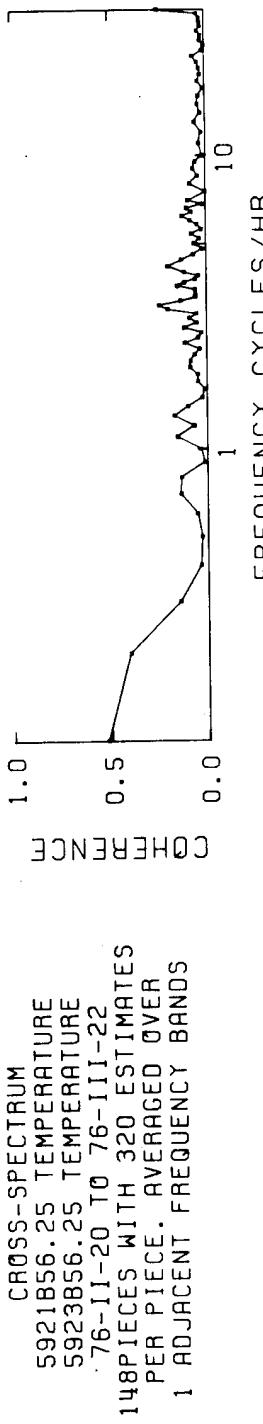
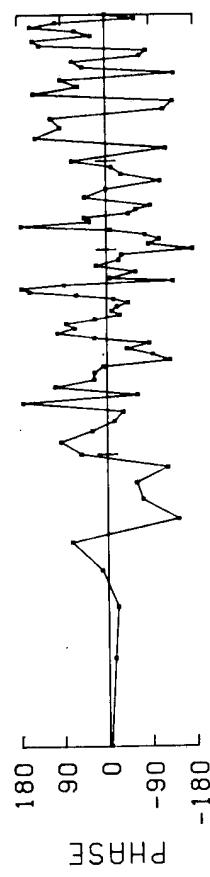
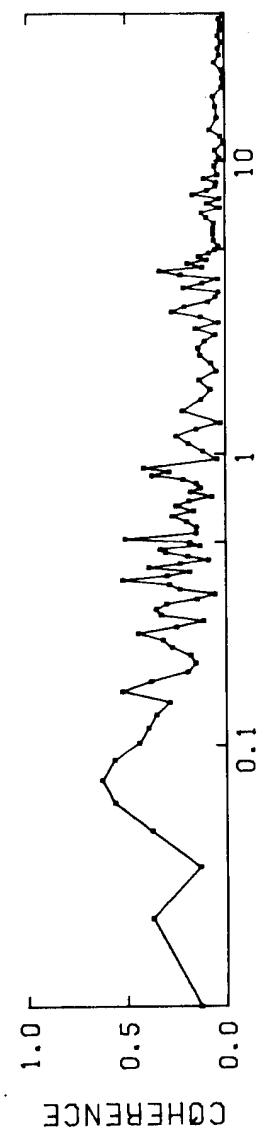
CROSS-SPECTRUM
5921B56.25 NORTH
5923B56.25 NORTH
76-11-20 TO 76-11-22
18 PIECES WITH 2500 ESTIMATES
PER PIECE. AVERAGED OVER
1 ADJACENT FREQUENCY BANDS



CROSS-SPECTRUM
5921B56.25 NORTH
5923B56.25 NORTH
76-11-20 TO 76-11-22
148PIECES WITH 320 ESTIMATES
PER PIECE. AVERAGED OVER
1 ADJACENT FREQUENCY BANDS



CROSS-SPECTRUM
5921B56.25 TEMPERATURE
5923B56.25 TEMPERATURE
76-11-20 TO 76-11-22
18 PIECES WITH 2500 ESTIMATES
PER PIECE. AVERAGED OVER
1 ADJACENT FREQUENCY BANDS



TWO-SIDED CROSS-SPECTRUM

18:53 MAY 03, 177

SERIES 1 A1	5921856.25	EAST	START	7602220	190028	STOP	760321	20701	SAMPLING RATE	56.25	SECONDS
SERIES 1 A2	5921856.25	NORTH	START	7602220	190028	STOP	760321	20701	SAMPLING RATE	56.25	SECONDS
SERIES 2 A1	5923856.25	EAST	START	7602220	190028	STOP	760321	20701	SAMPLING RATE	56.25	SECONDS
SERIES 2 A2	5923856.25	NORTH	START	7602220	190028	STOP	760321	20701	SAMPLING RATE	56.25	SECONDS

SPECTRUM OF SERIES WITH 45000 POINTS DIVIDED INTO 9 PIECES WITH 5000 POINTS IN EACH PIECE.
 2500 ESTIMATES AVERAGED OVER 1 ADJACENT FREQUENCY BANDS TO GIVE 2500 AVERAGED ESTIMATES.
 SPECTRUM UNITS (MM/S)
 UNITS OF TIME (T.U.) ARE HOURS

- - - - ANTI-CLOCKWISE COMPONENTS
 (POSITIVE FREQUENCIES)

EST NO	FREQ CYC/T.U.	SPECTRUM SERIES 1		CROSS SPECTRUM SERIES 2		SPECTRUM SERIES 1		CROSS SPECTRUM SERIES 2		CLOCKWISE COMPONENTS (NEGATIVE FREQUENCIES)	
		SPECTRUM	CROSS SPECTRUM	CROSS SPECTRUM	CROSS SPECTRUM	SPECTRUM	CROSS SPECTRUM	CROSS SPECTRUM	CROSS SPECTRUM	EST NO	PERIOD T.U.)
0	0.00	•60242E 02	•42465E 02	•44422E 02	•88	•0*	•42465E 02	•44422E 02	•88	•0*	0
1	•013	•61264E 02	•16558E 02	•81494E 02	•81	•29*	•1062E 03	•1102E 03	•5892E 02	•47*	•78.13
2	•026	•95241E 02	•26225E 02	•39741E 02	•80	•4*	•73343E 02	•73343E 02	•40039E 02	•75	•39.56
3	•038	•58501E 02	•97819E 02	•54300E 02	•72	•56*	•18912E 03	•15512E 03	•76947E 02	•45	•26.94
4	•051	•12426E 03	•92758E 02	•94449E 02	•88	•36*	•60704E 02	•31270E 02	•37006E 02	•85	•19.53
5	•064	•48000E 02	•34265E 02	•62*	•89	•62*	•18744E 02	•12294E 02	•41734E 01	•27	•128.
6	•077	•30269E 02	•37476E 02	•19281E 02	•57	•108*	•52314E 02	•63924E 02	•74749E 01	•13	•154.
7	•090	•47009E 02	•17529E 02	•19037E 02	•66	•125*	•10107E 02	•76422E 01	•80551E 00	•75	•11.16
8	•102	•10035E 02	•94425E 01	•56136E 01	•58	•155*	•25727E 02	•35603E 01	•71800E 01	•81	•9.97
9	•115	•68886E 01	•45721E 01	•13867E 01	•25	•157*	•81370E 01	•45619E 01	•57549E 01	•94	•176.
10	•128	•13594E 02	•10031E 02	•38542E 01	•33	•170*	•14182E 02	•63333E 01	•25765E 01	•27	•8.68
11	•141	•12484E 02	•17997E 01	•27797E 01	•59	•100*	•31220E 02	•31220E 01	•26609E 01	•29	•7.81
12	•154	•15021E 02	•41739E 01	•44874E 01	•57	•89*	•25784E 02	•17666E 02	•12354E 02	•58	•13.02
13	•166	•18114E 02	•68581E 01	•79779E 01	•72	•89*	•49714E 01	•11532E 02	•28530E 01	•10*	•11.16
14	•179	•10268E 02	•72817E 01	•47123E 01	•54	•84*	•73008E 01	•44471E 01	•42898E 01	•75	•6.97
15	•192	•22941E 02	•25941E 01	•64366E 01	•83	•142*	•12829E 02	•16584E 01	•42907E 01	•93	•5.58
16	•205	•93836E 01	•25377E 01	•23056E 01	•47	•122*	•43377E 01	•30761E 01	•30761E 01	•42	•134.
17	•218	•37628E 01	•12009E 01	•12849E 01	•60	•4*	•77388E 01	•86159E 01	•46178E 01	•57	•155.
18	•230	•24731E 01	•54371E 01	•96436E 00	•26	•34*	•53587E 01	•62033E 01	•40668E 01	•71	•180.
19	•243	•82949E 01	•14381E 01	•17956E 01	•52	•58*	•12546E 02	•31259E 01	•37141E 01	•59	•97.
20	•256	•44822E 01	•31287E 01	•25202E 01	•67	•109*	•16566E 02	•20547E 01	•36658E 01	•63	•5.21
21	•269	•65548E 01	•25377E 01	•23056E 01	•47	•165*	•17619E 01	•25662E 01	•16991E 01	•65	•13.4.
22	•282	•20197E 01	•43876E 01	•17251E 01	•58	•72*	•18038E 01	•17137E 01	•91361E 00	•52	•128.
23	•294	•29541E 01	•13659E 01	•58274E 00	•29	•92*	•24040E 01	•32436E 01	•24618E 01	•83	•11.55
24	•307	•36182E 01	•13098E 01	•99436E 00	•46	•115*	•12889E 01	•39568E 01	•14098E 01	•62	•4.34
25	•320	•21606E 01	•16348E 01	•92769E 00	•49	•109*	•40638E 01	•47901E 01	•36658E 01	•63	•3.26
26	•333	•94961E 00	•23901E 01	•56204E 00	•19	•165*	•35799E 01	•59161E 01	•16991E 01	•65	•3.91
27	•346	•48057E 01	•18921F 01	•2013E 01	•67	•58*	•13212E 01	•29622E 01	•91361E 00	•52	•3.72
28	•358	•47499E 00	•29466E 01	•40946E 00	•35	•128*	•2058RE 01	•32355E 01	•10099E 01	•39	•3.55
29	•371	•59262E 00	•26667E 01	•866602E 00	•69	•97*	•26660E 01	•97960E 01	•80523E 00	•57	•2.79
30	•384	•40407E 01	•30283E 01	•28698E 01	•82	•31*	•37871E 01	•11964E 01	•21302E 01	•47	•2.69
31	•397	•11816E 01	•87705E 00	•62276E 00	•24	•74*	•35799E 01	•59161E 01	•27672E 00	•19	•3.13
32	•410	•86651E 00	•15026E 01	•66146E 00	•58	•72*	•95427E 00	•73640E 00	•47150E 01	•66	•2.52
33	•422	•17366E 01	•11107E 01	•46950E 00	•34	•115*	•12366E 01	•63348E 00	•24511E 00	•57	•2.44
34	•435	•11436E 01	•61076E 00	•31935E 00	•38	•173*	•16007E 01	•13982E 01	•10577E 01	•71	•2.37
35	•448	•12076E 01	•63302E 00	•20292E 00	•23	•84*	•17536E 01	•14902E 01	•10101E 01	•47	•2.30
36	•461	•13013E 01	•82474E 00	•46726E 00	•45	•41*	•59647E 00	•89431E 00	•15858E 00	•22	•2.23
37	•474	•12979E 01	•111037E 01	•98054E 00	•82	•42*	•13212E 01	•67814E 00	•91361E 00	•57	•2.89
38	•486	•18172E 01	•65709E 00	•40022E 00	•37	•35*	•2058RE 01	•32355E 01	•17163E 01	•55	•2.11
39	•499	•85382E 00	•65782E 00	•31364E 00	•42	•97*	•17685E 01	•21185E 01	•10487E 01	•54	•2.06
										•11192E 01	•70
										•19823E 01	•34

40	142.	00	• 67624E 00	• 676179E 00	• 93473E 00	• 76179E 00	• 44133E 00	• 44133E 00	• 137.	142.
41	61.	00	• 10533E 01	• 17878E 01	• 21693E 01	• 92852E 00	• 67954E 00	• 67954E 00	• 165.	61.
42	1.86	00	• 92852E 00	• 86221E 00	• 23528E 00	• 95025E 00	• 22188E 00	• 22188E 00	• 178.	1.86
43	1.82	00	• 95025E 00	• 14232E 01	• 25374E 00	• 14232E 01	• 37742E 00	• 37742E 00	• 178.	1.82
44	4.4	00	• 14232E 01	• 17896E 01	• 15105E 01	• 17896E 01	• 77758E 00	• 77758E 00	• 174.	4.4
45	82.	00	• 15105E 01	• 14399E 01	• 15283E 01	• 14399E 01	• 11392E 01	• 11392E 01	• 174.	82.
46	1.70	00	• 15283E 01	• 14466E 01	• 64735E 00	• 14466E 00	• 49127E 00	• 49127E 00	• 170.	1.70
47	1.66	00	• 14466E 00	• 78560E 00	• 88962E 00	• 14466E 00	• 14186E 00	• 14186E 00	• 170.	1.66
48	4.8	00	• 78560E 00	• 78633E 00	• 63144E 00	• 78633E 00	• 32806E 00	• 32806E 00	• 163.	4.8
49	1.59	00	• 78633E 00	• 11340E 01	• 12870E 01	• 81784E 00	• 30366E 00	• 30366E 00	• 178.	1.59
50	1.45	00	• 11340E 01	• 12355E 01	• 40160E 00	• 64048E 00	• 22061E 00	• 22061E 00	• 145.	1.45
51	1.36	00	• 12355E 01	• 13039E 01	• 39701E 00	• 13039E 00	• 47334E 00	• 47334E 00	• 142.	1.36
52	5.1	00	• 13039E 01	• 16611E 00	• 40160E 00	• 16611E 00	• 14358E 00	• 14358E 00	• 142.	5.1
53	1.45	00	• 16611E 00	• 11927E 00	• 22709E 00	• 11927E 00	• 11927E 00	• 11927E 00	• 145.	1.45
54	1.42	00	• 11927E 00	• 11413E 00	• 59125E 00	• 11413E 00	• 41168E 00	• 41168E 00	• 142.	1.42
55	1.32	00	• 11413E 00	• 30152E 00	• 17109E 00	• 84944E 00	• 28478E 00	• 28478E 00	• 132.	1.32
56	6.0	00	• 30152E 00	• 23309E 00	• 27422E 00	• 23309E 00	• 45971E 00	• 45971E 00	• 130.	6.0
57	1.28	00	• 23309E 00	• 35437E 00	• 42039E 00	• 35437E 00	• 17423E 00	• 17423E 00	• 128.	1.28
58	1.26	00	• 35437E 00	• 35712E 00	• 42044E 00	• 35712E 00	• 17025E 00	• 17025E 00	• 126.	1.26
59	1.24	00	• 35712E 00	• 32085E 00	• 42261E 00	• 32085E 00	• 25324E 00	• 25324E 00	• 124.	1.24
60	6.4	00	• 32085E 00	• 29259E 00	• 46885E 00	• 29259E 00	• 16785E 01	• 16785E 01	• 122.	6.4
61	1.20	00	• 29259E 00	• 31577E 00	• 58200E 00	• 31577E 00	• 10370E 01	• 10370E 01	• 120.	1.20
62	6.1	00	• 31577E 00	• 44593E 00	• 54285E 00	• 44593E 00	• 77714E 00	• 77714E 00	• 118.	6.1
63	1.26	00	• 44593E 00	• 44723E 00	• 53292E 00	• 44723E 00	• 13013E 00	• 13013E 00	• 117.	1.26
64	1.24	00	• 44723E 00	• 27703E 00	• 53256E 00	• 44723E 00	• 45724E 00	• 45724E 00	• 115.	1.24
65	6.5	00	• 27703E 00	• 97852E 01	• 42261E 00	• 97852E 01	• 16785E 01	• 16785E 01	• 122.	6.5
66	1.20	00	• 97852E 01	• 20850E 00	• 58200E 00	• 20850E 00	• 10370E 01	• 10370E 01	• 120.	1.20
67	6.7	00	• 20850E 00	• 42834E 00	• 54285E 00	• 42834E 00	• 77714E 00	• 77714E 00	• 117.	6.7
68	1.15	00	• 42834E 00	• 44726E 00	• 53292E 00	• 44726E 00	• 15391E 00	• 15391E 00	• 115.	1.15
69	1.13	00	• 44726E 00	• 27703E 00	• 53256E 00	• 44726E 00	• 78765E 01	• 78765E 01	• 113.	1.13
70	7.0	00	• 27703E 00	• 98961E 00	• 58129E 00	• 27703E 00	• 41913E 00	• 41913E 00	• 112.	7.0
71	1.12	00	• 98961E 00	• 59665E 00	• 54614E 00	• 98961E 00	• 30994E 00	• 30994E 00	• 112.	1.12
72	7.1	00	• 59665E 00	• 58940E 00	• 54614E 00	• 58940E 00	• 72385E 00	• 72385E 00	• 110.	7.1
73	1.10	00	• 58940E 00	• 40254E 00	• 53292E 00	• 40254E 00	• 44411E 00	• 44411E 00	• 109.	1.10
74	6.8	00	• 40254E 00	• 32085E 00	• 53256E 00	• 40254E 00	• 45544E 00	• 45544E 00	• 107.	6.8
75	1.13	00	• 32085E 00	• 29259E 00	• 53446E 00	• 32085E 00	• 45544E 00	• 45544E 00	• 106.	1.13
76	7.5	00	• 29259E 00	• 31577E 00	• 57822E 00	• 29259E 00	• 77133E 00	• 77133E 00	• 104.	7.5
77	1.12	00	• 31577E 00	• 44593E 00	• 52262E 00	• 31577E 00	• 22629E 00	• 22629E 00	• 103.	1.12
78	7.7	00	• 44593E 00	• 44726E 00	• 51141E 00	• 44593E 00	• 28478E 00	• 28478E 00	• 102.	7.7
79	7.9	00	• 44726E 00	• 27703E 00	• 51141E 00	• 44726E 00	• 72385E 00	• 72385E 00	• 101.	7.9
80	8.0	00	• 27703E 00	• 98961E 00	• 51141E 00	• 27703E 00	• 31411E 00	• 31411E 00	• 100.	8.0
81	8.1	00	• 98961E 00	• 56521E 00	• 51141E 00	• 98961E 00	• 32694E 00	• 32694E 00	• 99.	8.1
82	8.2	00	• 56521E 00	• 58231E 00	• 51141E 00	• 56521E 00	• 10693E 00	• 10693E 00	• 98.	8.2
83	8.3	00	• 58231E 00	• 27703E 00	• 51141E 00	• 58231E 00	• 32423E 00	• 32423E 00	• 97.	8.3
84	8.4	00	• 27703E 00	• 97852E 01	• 51141E 00	• 27703E 00	• 78765E 01	• 78765E 01	• 96.	8.4
85	8.5	00	• 97852E 01	• 20850E 00	• 51141E 00	• 97852E 01	• 22629E 00	• 22629E 00	• 95.	8.5
86	8.6	00	• 20850E 00	• 44726E 00	• 51141E 00	• 20850E 00	• 22777E 00	• 22777E 00	• 94.	8.6
87	8.7	00	• 44726E 00	• 27703E 00	• 51141E 00	• 44726E 00	• 32694E 00	• 32694E 00	• 93.	8.7
88	8.8	00	• 27703E 00	• 98961E 00	• 51141E 00	• 27703E 00	• 78765E 01	• 78765E 01	• 92.	8.8
89	8.9	00	• 98961E 00	• 58231E 00	• 51141E 00	• 98961E 00	• 32439E 00	• 32439E 00	• 91.	8.9
90	9.0	00	• 58231E 00	• 27703E 00	• 51141E 00	• 58231E 00	• 30189E 00	• 30189E 00	• 90.	9.0
91	9.1	00	• 27703E 00	• 98961E 00	• 51141E 00	• 27703E 00	• 74743E 00	• 74743E 00	• 89.	9.1
92	9.2	00	• 98961E 00	• 58231E 00	• 51141E 00	• 98961E 00	• 12044E 00	• 12044E 00	• 88.	9.2
93	9.3	00	• 58231E 00	• 27703E 00	• 51141E 00	• 58231E 00	• 45544E 00	• 45544E 00	• 87.	9.3
94	9.4	00	• 27703E 00	• 98961E 00	• 51141E 00	• 27703E 00	• 78765E 01	• 78765E 01	• 86.	9.4
95	9.5	00	• 98961E 00	• 58231E 00	• 51141E 00	• 98961E 00	• 32439E 00	• 32439E 00	• 85.	9.5
96	9.6	00	• 58231E 00	• 27703E 00	• 51141E 00	• 58231E 00	• 74743E 00	• 74743E 00	• 84.	9.6
97	9.7	00	• 27703E 00	• 98961E 00	• 51141E 00	• 27703E 00	• 32694E 00	• 32694E 00	• 83.	9.7
98	9.8	00	• 98961E 00	• 58231E 00	• 51141E 00	• 98961E 00	• 74743E 00	• 74743E 00	• 82.	9.8
99	9.9	00	• 58231E 00	• 27703E 00	• 51141E 00	• 58231E 00	• 32694E 00	• 32694E 00	• 81.	9.9

100	1.280	*10740E 00	*56721E-01	*10150E 00
101	1.293	*22723E 00	*27684E 00	*16492E-01
102	1.306	*32039E 00	*53977E 00	*14454E 00
103	1.318	*14405E 00	*15468E 00	*18728E 00
104	1.331	*12872E 00	*45202E 00	*17954E 00
105	1.344	*13698E 00	*67668E 00	*22205E 00
106	1.357	*2834F 00	*26919E 00	*53901E-01
107	1.370	*20473E 00	*32828E 00	*20307E 00
108	1.382	*17127E 00	*16228E 00	*21677E 00
109	1.395	*10900E 00	*84737E-01	*15463E 00
110	1.408	*18374E 00	*27542E 00	*32725E 00
111	1.421	*15819E 00	*20473E 00	*10228E 00
112	1.434	*33059E 00	*69210E-01	*17127E 00
113	1.446	*33474E 00	*83776F-01	*23753E 00
114	1.459	*75986E 00	*79228E-01	*12130E 00
115	1.472	*32230E 00	*12971E 00	*10079E 00
116	1.485	*26483F 00	*21341E 00	*13698E 00
117	1.498	*27575E 00	*44978E-01	*10900E 00
118	1.510	*37991E 00	*11731E 00	*16256E 00
119	1.523	*64169E 00	*19454F 00	*24610E 00
120	1.536	*65604E-01	*79442F-01	*42756E-01
121	1.549	*17578E 00	*18602F 00	*13822E 00
122	1.562	*43416E 00	*36284E 00	*19156E 00
123	1.574	*22535E 00	*24638E 00	*17556E 00
124	1.587	*21333E 00	*78310E-01	*10302E 00
125	1.600	*40248E 00	*13175E 00	*72066E-01
126	1.613	*37803E 00	*31197E-01	*57463E-01
127	1.626	*15253E 00	*85015E-01	*91183E-01
128	1.638	*24453E 00	*72727E-01	*10779E 00
129	1.651	*45859E 00	*28279E 00	*16676E 00
130	1.664	*17214E 00	*23504E 00	*19215E 00
131	1.677	*18344E 00	*12362E 00	*13075E 00
132	1.690	*30831E 00	*411222E-01	*79091E-01
133	1.702	*17828E 00	*33514E 00	*18971E 00
134	1.715	*53322E 00	*27255E 00	*31743E 00
135	1.728	*24323E 00	*55799F-01	*50361E-01
136	1.741	*20131E 00	*20578F 00	*10239E 00
137	1.754	*33428E 00	*12898E 00	*19991E 00
138	1.766	*19247E 00	*44600E-01	*42690E-01
139	1.779	*42095E 00	*52064F-01	*14744E 00
140	1.792	*35479E 00	*71210E-01	*34946E-01
141	1.805	*23915E 00	*44854E-01	*80092E-01
142	1.818	*49028E 00	*31627F 00	*65842E-01
143	1.830	*16440E 00	*13679F 00	*13071E 00
144	1.843	*16430E 00	*13721E 00	*22334E-01
145	1.856	*33016E 00	*12627F 00	*10456E 00
146	1.869	*25392E 00	*11242E 00	*92999E 01
147	1.882	*28419E 00	*45661E-01	*10691E 00
148	1.894	*19905E 00	*58556E-01	*42802E-01
149	1.907	*24364E 00	*68378E-01	*74006E-01
150	1.920	*11328E 00	*95645E-01	*83349E-01
151	1.933	*14458E 00	*14484E 00	*66121E-01
152	1.946	*15962E 00	*36802F-01	*33257E-01
153	1.958	*13118E 00	*11134E 00	*72929E-01
154	1.971	*46793E 00	*70169E-01	*11316E 00
155	1.984	*31484E 00	*82653F-01	*86010E-01
156	1.997	*88736E-01	*15706F 00	*74499E-01
157	2.010	*20181E 00	*19045E 00	*14579E 00
158	2.022	*14234E 00	*81620E-01	*83358E-01
159	2.035	*28999E 00	*11200E 00	*99387E-01
				*55
				94
				95
				96
				97
				98
				99
				100

160	2.048	*21579E*01	.87	156.	*38705E*01	*90497E*01	*90864E*00	*63300E*01	*20864E*00	*87019E*01	*18943E*00	*27683E*01	*949	161
161	2.061	*42912E*01	.20	1.	*48670E*01	*48911E*02	.04	*79.	*12286E*00	*16879E*00	*11524E*00	*80	152	
162	2.074	*30127E*00	*4.8670E*01	.47	*33225E*01	*37505E*01	.47	*84.	*1937E*00	*63719E*01	*71789E*01	*65	153	
163	2.086	*19409E*00	*3.9620E*00	.49	*50387E*01	*39608E*01	.49	177.	*83519E*01	*14143E*01	*75959E*01	*70	154	
164	2.099	*26729E*00	*4.2662E*00	.62	*15909E*00	*16024E*00	.62	83.	*15025E*00	*21100E*00	*37934E*01	*21	155	
165	2.112	*2.3644E*00	*79554E*01	.49	*2.3644E*00	*67629E*01	.49	*2.	*25295E*00	*55823E*01	*22328E*01	*19	156	
166	2.125	*1.6620E*00	*31345E*01	.40	*1.6620E*00	*83520E*01	.34	20.	*3378E*00	*61138E*01	*10081E*00	*79	157.	
167	2.138	*41080E*00	*37913E*00	.52	*26216E*00	*10587E*00	.52	29.	*12120E*00	*14968E*00	*10642E*00	*79	158.	
168	2.150	*53386E*00	*53386E*00	.54	*14555E*00	*91791E*01	.54	*105.	*78234E*01	*37855E*01	*20366E*01	*37	159.	
169	2.163	*20732E*00	*62537E*01	.91	*10393E*00	*10393E*01	.91	*71.	*72842E*00	*86032E*01	*19637E*00	*75	170.	
170	2.176	*1.7153E*00	*1.5974E*00	.40	*66853E*01	*66853E*01	.91	130.	*62487E*01	*10728E*00	*47276E*01	*58	165.	
171	2.189	*1.3587E*00	*70975E*01	.64	*1.3587E*00	*89486E*01	.63	*136.	*82767E*01	*99167E*01	*45817E*01	*51	146.	
172	2.202	*88968E*01	*11496E*00	.64	*55082E*01	*55082E*01	.41	69.	*15848E*00	*12893E*00	*81683E*01	*57	178.	
173	2.214	*41080E*00	*83520E*01	.52	*97211E*01	*62106E*01	.65	56.	*17897E*00	*10236E*00	*11211E*00	*83	178.	
174	2.227	*53386E*00	*54197E*01	.54	*82561E*01	*55361E*01	.56	*105.	*32705E*00	*10722E*01	*31670E*01	*53	179.	
175	2.240	*22749E*00	*42866E*01	.56	*42866E*01	*74068E*01	.51	*129.	*93391E*00	*13986E*00	*36061E*01	*22	180.	
176	2.253	*1.3587E*00	*70975E*01	.91	*89486E*01	*89486E*01	.91	*63.	*73547E*01	*48722E*01	*47978E*01	*74	176.	
177	2.266	*27415E*00	*65852E*01	.41	*51730E*01	*51730E*01	.78	*117.	*22046E*00	*12352E*00	*60936E*01	*37	133.	
178	2.278	*20632E*00	*44310F*01	.30	*10527E*00	*10307E*00	.30	*103.	*21954E*00	*75347E*01	*76033E*01	*59	88.	
179	2.291	*104141E*01	*110411E*01	.11	*129.	*43432E*01	.28	60.	*14681E*00	*36879E*01	*40033E*01	*54	59.	
180	2.304	*41123E*00	*50855E*01	.60	*20638E*00	*55953E*01	.46	*46719E*01	*10024E*00	*91232E*01	*54753E*01	*57	71.	
181	2.317	*31050E*00	*82718E*01	.75	*12003E*00	*12003E*00	.75	*80.	*17629E*00	*92765E*01	*94798E*01	*74	144.	
182	2.330	*84958E*01	*51730E*01	.39	*51615E*01	*51615E*01	.78	*117.	*28081E*00	*13094E*00	*12579E*00	*66	22.	
183	2.342	*10451E*00	*96857E*01	.30	*30042E*01	*30042E*01	.30	*103.	*91669E*01	*18614E*01	*29156E*01	*71	99.	
184	2.355	*37920E*00	*61803E*01	.43	*43432E*01	*43432E*01	.43	*48.	*17952E*00	*40495E*01	*40257E*01	*47	14.	
185	2.368	*20638E*00	*55953E*01	.60	*10256E*00	*10256E*00	.67	*18.	*16551E*00	*15551E*01	*17579E*01	*35	83.	
186	2.381	*25326E*00	*15379E*00	.52	*19619E*01	*19619E*01	.67	*18.	*28081E*00	*13094E*00	*12579E*00	*66	22.	
187	2.394	*61935E*01	*10269E*00	.39	*30994E*01	*30994E*01	.39	*161.	*91669E*01	*18614E*01	*29156E*01	*71	187.	
188	2.406	*14732E*00	*94654E*01	.68	*80176E*01	*80176E*01	.68	55.	*37788E*00	*81924E*01	*89378E*01	*51	129.	
189	2.419	*20541E*00	*56495E*01	.60	*64408E*01	*64408E*01	.60	*48.	*17952E*00	*40495E*01	*40257E*01	*47	14.	
190	2.432	*25326E*00	*15379E*00	.25	*13682E*01	*13682E*01	.25	*95.	*14335E*00	*86426E*01	*126610E*01	*24	195.	
191	2.445	*10832E*00	*36287E*01	.63	*39188E*01	*39188E*01	.63	*69.	*13342E*00	*56028E*01	*63153E*01	*73	157.	
192	2.458	*44739E*00	*36453E*00	.44	*11917E*00	*11917E*00	.44	92.	*15352E*00	*52131E*01	*50537E*01	*56	169.	
193	2.470	*92708E*01	*72122E*01	.77	*63236E*01	*63236E*01	.77	*173.	*12107E*00	*15989E*00	*50246E*01	*36	64.	
194	2.483	*14887E*00	*56293E*01	.75	*69063E*01	*69063E*01	.75	*20.	*14752E*00	*10299E*00	*25493E*01	*21	33.	
195	2.496	*60314E*01	*48161E*01	.41	*48161E*01	*13682E*01	.25	*95.	*14335E*00	*86426E*01	*126610E*01	*24	39.	
196	2.509	*29269E*00	*55804E*01	.16	*21036E*01	*36287E*01	.29	158.	*13342E*00	*56028E*01	*63153E*01	*73	196.	
197	2.522	*26124E*00	*94693E*01	.64	*45160E*01	*45160E*01	.77	*31.	*17400E*00	*93037E*01	*84678E*01	*67	4.	
198	2.534	*36545E*00	*48484E*01	.01	*10287E*00	*37754E*01	.44	*157.	*48587E*01	*10711E*00	*10169E*01	*14	-50.	
199	2.547	*14719E*00	*50996E*01	.48	*37754E*01	*37754E*01	.48	*141.	*27008E*00	*98563E*01	*62888E*01	*39	81.	
200	2.560	*85127E*01	*39754E*01	.38	*22374E*01	*22374E*01	.59	*100.	*77363E*01	*56118E*01	*56118E*01	*39	77.	
201	2.573	*14278E*00	*84738E*01	.55	*60988E*01	*60988E*01	.68	*169.	*11852E*00	*84345E*01	*52131E*01	*47	56.	
202	2.586	*35379E*00	*32444E*01	.64	*48484E*01	*66443E*01	.60	*123.	*23604E*00	*444189E*01	*84678E*01	*40	39.	
203	2.598	*24517E*00	*16245E*00	.33	*54353E*01	*68292E*01	.70	*104.	*17400E*00	*93037E*01	*74631E*01	*67	4.	
204	2.611	*96141E*01	*13641E*01	.48	*55487E*01	*55487E*01	.48	*125.	*48587E*01	*68941E*01	*53986E*01	*35	148.	
205	2.624	*10667E*00	*33174E*01	.38	*34803E*01	*34803E*01	.59	*100.	*27008E*00	*40965E*01	*12152E*01	*22	-97.	
206	2.637	*57456E*01	*41158E*01	.33	*33019E*01	*33019E*01	.68	*15.	*35084E*01	*94836E*01	*48100E*01	*65	-39.	
207	2.650	*76527E*01	*52482E*01	.32	*20212E*01	*54353E*01	.64	*123.	*44279E*00	*66731E*01	*54537E*01	*62	110.	
208	2.662	*10278E*00	*58595E*01	.01	*66443E*01	*66443E*01	.33	*155.	*15208E*00	*65608E*01	*59930E*01	*67	95.	
209	2.675	*15780E*00	*64294E*01	.68	*68292E*01	*68292E*01	.68	*104.	*29603E*00	*45669E*01	*73239E*01	*63	1.	
210	2.688	*14559E*00	*49118E*01	.24	*34803E*01	*34803E*01	.48.	*48.	*10005E*00	*37618E*01	*23855E*01	*39	119.	
211	2.701	*68075E*01	*22575E*01	.93	*36584E*01	*36584E*01	.93	*149.	*19642E*01	*54842E*01	*48100E*01	*72	37.	
212	2.714	*89567E*01	*35317E*01	.60	*33533E*01	*33533E*01	.60	*95.	*10644E*00	*57603E*01	*54537E*01	*67	106.	
213	2.726	*57809E*01	*78524E*01	.49	*32720E*01	*32720E*01	.49	*15.	*4279E*00	*67517E*01	*72841E*01	*56	49.	
214	2.739	*16542E*00	*64798E*01	.40	*41113E*01	*41113E*01	.40	*101.	*19393E*00	*47900E*01	*34822E*01	*41	169.	
215	2.752	*13513E*00	*52793E*01	.93	*34169E*01	*34169E*01	.68	*132.	*50936E*01	*17195E*00	*39067E*01	*42	123.	
216	2.765	*31206E*00	*54128E*01	.73	*95196E*01	*95196E*01	.73	*88.	*16864E*00	*51591E*01	*66774E*01	*72	177.	
217	2.778	*23928E*00	*11281E*00	.94	*15449E*00	*15449E*00	.94	*40.	*88228E*01	*90750E*02	*17434E*01	*62	176.	
218	2.790	*16494E*01	*46623E*01	.34	*94777E*02	*94777E*02	.34	*17.	*87171E*02	*17171E*02	*17171E*02	*18	218.	
219	2.803	*35970E*00	*45049E*01	.70	*88976E*01	*88976E*01	.70	*13.	*45049E*01	*61354E*01	*61354E*01	*63	219.	

2.816	2.829	•66021E•01	•14598E•01	•2.6524E•01	•1.3697E•00	•1.0352E•01	•1.9667E•01	•36
220	2.842	•15131E•00	•42954E•01	•58325E•01	•33811E•00	•11803E•01	•11618E•00	220
221	2.842	•11528E•00	•10930E•00	•43691E•01	•56	•150•	•14043E•00	221
222	2.854	•14833E•00	•41735E•01	•54769E•01	•56	•129•	•28698E•01	222
223	2.867	•14722E•00	•25256E•01	•54769E•01	•90	•46•	•14441E•00	223
224	2.880	•63628E•01	•15151E•01	•11378E•01	•37	•176•	•72481E•01	224
225	2.893	•66020E•01	•15742E•01	•16966E•01	•52	•41•	•80543E•01	225
226	2.906	•63228E•01	•50504E•01	•37693E•01	•67	•83•	•70689E•01	226
227	2.918	•76376E•01	•41548E•01	•11803E•01	•21	•122•	•12684E•01	227
228	2.931	•16742E•00	•64859E•01	•19246E•01	•18	•102•	•11244E•00	228
229	2.944	•91093E•01	•14902E•00	•58569E•01	•50	•148•	•11869E•00	229
230	2.944	•18504E•00	•25789E•01	•21820E•01	•32	•164•	•19442E•01	230
231	2.957	•12871E•00	•35740E•01	•41717E•01	•62	•53•	•10065E•00	231
232	2.970	•20972E•00	•67905E•01	•55479E•01	•66	•66•	•11553E•00	232
233	2.982	•24753E•00	•36519E•01	•54728E•01	•46	•58•	•16833E•00	233
234	2.995	•91093E•01	•14902E•00	•58569E•01	•66	•81•	•10507E•00	234
235	3.008	•21180E•00	•29197E•01	•99970E•02	•13	•180•	•10767E•01	235
236	3.021	•15723E•00	•54101E•01	•52426E•01	•57	•163•	•58849E•01	236
237	3.034	•16677E•00	•44680E•01	•74515E•01	•86	•121•	•78337E•01	237
238	3.046	•10224E•00	•10351E•00	•70937E•01	•76	•154•	•12047E•01	238
239	3.059	•11126E•00	•15511E•00	•96156E•01	•66	•81•	•11231E•00	239
240	3.072	•81980E•01	•10974E•00	•80447E•01	•85	•46•	•11342E•00	240
241	3.085	•88979E•01	•10727E•00	•31284E•01	•32	•54•	•62858E•01	241
242	3.098	•69471E•01	•10473E•01	•35437E•01	•86	•45•	•12047E•01	242
243	3.110	•54872E•01	•15698E•01	•17141E•01	•58	•14•	•12097E•01	243
244	3.123	•81719E•01	•16574E•00	•94451E•01	•81	•87•	•19236E•00	244
245	3.136	•11236E•00	•37810E•01	•45062E•02	•07	•69•	•17271E•00	245
246	3.149	•30613E•00	•73616E•01	•64791E•01	•43	•12•	•16947E•00	246
247	3.162	•28477E•01	•91409E•01	•38064E•01	•75	•98•	•23991E•00	247
248	3.174	•15396E•00	•91873E•01	•70884E•01	•60	•45•	•10762E•00	248
249	3.187	•93779E•01	•13577E•00	•92058E•01	•82	•51•	•12097E•01	249
250	3.200	•11466E•00	•43530E•01	•52347E•01	•74	•172•	•19236E•00	250
251	3.213	•32613E•00	•16738E•01	•16679E•01	•23	•120•	•17263E•00	251
252	3.226	•15645E•00	•41579E•01	•28138E•01	•35	•145•	•12572E•00	252
253	3.238	•19835E•00	•61156E•01	•23906E•01	•22	•151•	•12482E•00	253
254	3.251	•11638E•00	•20042E•00	•18199E•01	•38	•77•	•30152E•00	254
255	3.264	•61490E•01	•59022E•02	•48727E•02	•26	•35•	•16802E•00	255
256	3.277	•34316E•00	•83773E•01	•81310E•01	•48	•25•	•10925E•00	256
257	3.290	•51503E•01	•44181E•01	•22054E•01	•46	•51•	•13658E•00	257
258	3.302	•13707E•00	•27777E•01	•49620E•01	•80	•106•	•72728E•01	258
259	3.315	•25318E•00	•14066E•00	•12873E•00	•79	•111•	•90632E•01	259
260	3.328	•63007E•01	•149629E•01	•21087E•01	•38	•57•	•28697E•01	260
261	3.341	•16141E•00	•32415E•01	•69474E•02	•10	•138•	•23720E•01	261
262	3.354	•14393E•00	•59554E•01	•45204E•01	•49	•88•	•10952E•01	262
263	3.366	•92174E•01	•14604E•00	•61699E•01	•53	•159•	•13648E•00	263
264	3.379	•10199E•00	•10329E•00	•54230E•01	•53	•51•	•13552E•00	264
265	3.392	•10956E•00	•92342E•01	•28913E•01	•29	•66•	•93738E•01	265
266	3.405	•76622E•01	•926551E•01	•50000E•01	•76	•34•	•95907E•01	266
267	3.418	•49725E•00	•18965E•01	•458821E•01	•71	•56•	•90122E•01	267
268	3.430	•22416E•00	•20727E•01	•19019E•01	•28	•140•	•13554E•00	268
269	3.443	•82141E•01	•79109E•01	•63464E•01	•79	•14•	•16442E•01	269
270	3.456	•57562E•01	•50635E•01	•34870E•01	•65	•20•	•14555E•00	270
271	3.469	•11584E•00	•48596E•01	•48596E•01	•45	•8•	•90122E•01	271
272	3.482	•37459E•01	•44954E•01	•32527E•01	•79	•132•	•14642E•00	272
273	3.494	•20066E•00	•37330E•01	•65476E•01	•76	•153•	•21757E•00	273
274	3.507	•13307E•00	•29730E•01	•21872E•01	•35	•123•	•10715E•00	274
275	3.520	•94744E•01	•25830E•01	•24551E•01	•50	•44•	•53659E•01	275
276	3.533	•18291E•00	•74945E•01	•40683E•01	•36	•167•	•119541E•01	276
277	3.546	•10997E•00	•25959E•01	•41995E•01	•79	•160•	•10982E•00	277
278	3.558	•11887E•00	•89361E•01	•79587E•01	•77	•159•	•12769E•01	278
279	3.571	•22125E•00	•30121E•01	•64105E•01	•79	•44•	•11553E•01	279
							•84247E•01	
							•21374E•00	

3.584	• 98862E•01	• 522870E•01	• 24816E•01	• 113•	• 63•
280	• 21009E 00	• 522990E•01	• 50855E•02	• 05	• 88•
281	• 13808E 00	• 40415E•01	• 12758E•01	• 17	• 88•
282	• 27771E•01	• 42326E•01	• 16546E•01	• 48	• 107•
283	• 3•622	• 33484E•01	• 76560E•02	• 36	• 126•
284	• 13448E•01	• 33794E•00	• 38359E•01	• 52	• 125•
285	• 3•648	• 16258E•00	• 67009E•01	• 24	• 99•
286	• 3•661	• 66565E•01	• 15707E•01	• 39	• 6•
287	• 3•674	• 86510E•01	• 41527E•02	• 11	• 30•
288	• 3•686	• 21777E•01	• 80629E•01	• 80	• 109•
289	• 3•699	• 11645E•01	• 36494E•01	• 43	• 54•
290	• 3•712	• 65756E•01	• 31490E•01	• 63	• 112•
291	• 3•725	• 77297E•01	• 59895E•01	• 26668E•01	• 39
292	• 3•738	• 24268E 00	• 29302E•01	• 11298E•01	• 13
293	• 3•750	• 68359E•01	• 51777E•01	• 32515E•01	• 55
294	• 3•763	• 66585E•01	• 58813E•01	• 27183E•01	• 43
295	• 3•776	• 43829E•01	• 65302E•01	• 41409E•01	• 77
296	• 3•789	• 57189E•01	• 42028E•01	• 37328E•01	• 76
297	• 3•802	• 75085E•01	• 32381E•01	• 11522E•01	• 23
298	• 3•814	• 67327E•01	• 40277E•01	• 20462E•01	• 39
299	• 3•827	• 22320E•01	• 10672E•00	• 46008E•02	• 151•
300	• 3•840	• 82157E•01	• 28564E•01	• 39366E•01	• 81
301	• 3•853	• 14687E•00	• 37631E•01	• 57725E•01	• 78
302	• 3•866	• 87837E•01	• 32903E•01	• 24569E•01	• 46
303	• 3•878	• 18814E•00	• 41169E•01	• 44035E•01	• 50
304	• 3•891	• 90078E•01	• 27954E•01	• 13837E•01	• 28
305	• 3•904	• 74107E•01	• 37194E•01	• 29658E•01	• 56
306	• 3•917	• 85759E•01	• 48437E•01	• 50067E•01	• 78
307	• 3•930	• 20039E 00	• 46872E•01	• 47666E•01	• 49
308	• 3•942	• 10995E 00	• 10355E•01	• 12473E•01	• 37
309	• 3•955	• 41477E•01	• 47163E•01	• 14022E•01	• 32
310	• 3•968	• 13567E•00	• 39351E•01	• 41557E•01	• 57
311	• 3•981	• 22680E 00	• 66980E•01	• 13775E•01	• 52•
312	• 3•994	• 10972E 00	• 38718E•01	• 18553E•01	• 28
313	• 4•006	• 14839E 00	• 71449E•01	• 57505E•01	• 56
314	• 4•019	• 12205E 00	• 38609E•01	• 11667E•01	• 17
315	• 4•032	• 25647E•01	• 25928E•01	• 74489E•02	• 29
316	• 4•045	• 83402E•01	• 34505E•01	• 44524E•01	• 84
317	• 4•058	• 49982E•01	• 67471E•01	• 30842E•01	• 53
318	• 4•070	• 27347E•01	• 13749E•01	• 10715E•01	• 55
319	• 4•083	• 27661E•01	• 50265E•01	• 20692E•01	• 55
320	• 4•096	• 74847E•01	• 31605E•01	• 22863E•01	• 47
321	• 4•109	• 14110E 00	• 14110E 00	• 14868E•01	• 17259E•01
322	• 4•122	• 19118E 00	• 47218E•01	• 73250E•01	• 77
323	• 4•134	• 91098E•01	• 31259E•01	• 49582E•01	• 93
324	• 4•147	• 63893E•01	• 45070E•01	• 18932E•01	• 35
325	• 4•160	• 15166E 00	• 23777E•01	• 33213E•01	• 55
326	• 4•173	• 29154E•01	• 65950E•01	• 55835E•01	• 53
327	• 4•186	• 14806E 00	• 19653E•01	• 19653E•01	• 43
328	• 4•198	• 65741E•01	• 11350E•01	• 28769E•01	• 88
329	• 4•211	• 62322E•01	• 10551E•01	• 10155E•01	• 40
330	• 4•224	• 69433E•01	• 14145E•01	• 44006E•02	• 14
331	• 4•237	• 29154E•01	• 53631E•01	• 11870E•01	• 30
332	• 4•250	• 96230E•01	• 56156E•01	• 11324E•01	• 43
333	• 4•263	• 10414E 00	• 79187E•01	• 31748E•01	• 132
334	• 4•275	• 97293E•01	• 55438E•01	• 12477E•01	• 17
335	• 4•288	• 62837E•01	• 49814E•01	• 12881E•01	• 23
336	• 4•301	• 43041E•01	• 43215E•01	• 15676E•01	• 36
337	• 4•314	• 45054E•01	• 24293E•01	• 18341E•01	• 58
338	• 4•326	• 75807E•01	• 44696E•01	• 39397E•01	• 68
339	• 4•339	• 93926E•01	• 37780E•01	• 11303E•01	• 19

15105 APR 26, 1977

	EAST	START	760220	190028	STOP	760321	20701	SAMPLING RATE	56.25
A1	5921B56.25	START	760220	190028	STOP	760321	20701	SAMPLING RATE	56.25
A2	5921B56.25							SECONDS	SECONDS

SPECTRUM OF SERIES WITH 45000 POINTS DIVIDED INTO 9 PIECES WITH 5000 POINTS IN EACH PIECE.
 2500 ESTIMATES AVERAGED OVER 1 ADJACENT FREQUENCY BANDS TO GIVE 2500 AVERAGED ESTIMATES.
 SPECTRUM UNITS: (MM/S)
 UNITS OF TIME (T.U.) ARE HOURS
 ORIENTATIONS ARE CLOCKWISE FROM NORTH

ESTIMATE NUMBER	FREQUENCY CYCLES/T.U.	CLOCKWISE SPECTRUM	ANTI-CLOCKWISE SPECTRUM	TOTAL SPECTRUM	ROTARY COEFFICIENT	ELLIPSE ORIENTATION	MEAN ORIENTATION	PERIOD T.U./CYCLE	ESTIMATE NUMBER
0	.000	*20864E-10	*20864E-10	*20864E-10	*000	51.	*40	63.	0
1	*013	*34384E-03	*21837E-03	*21822E-03	*0237	70.	*29	69.	78.1
2	*026	*21837E-03	*97470E-02	*31584E-03	*383	38.	*25	10.	39.6
3	*038	*62622E-03	*14251E-03	*76874E-03	*629	23.	*75	20.	26.0
4	*051	*10178E-03	*68264E-02	*17003E-03	*197	18.	*28	33.	19.5
5	*064	*15027E-03	*94964E-02	*24523E-03	*226	83.	*29	64.	15.6
6	*077	*38135E-03	*40417E-03	*78552E-03	*029	35.	*56	35.	13.0
7	*090	*14269E-03	*17615E-03	*31884E-03	*105	37.	*37	47.	11.1
8	*102	*10905E-03	*33873E-02	*14292E-03	*526	356.	*07	175.	7
9	*115	*42799E-02	*22781E-02	*6581E-02	*305	9.	*29	2.	8.6
10	*128	*46694E-02	*23887E-02	*70581E-02	*323	48.	*17	33.	7.8
11	*141	*42241E-02	*23315E-02	*65556E-02	*289	102.	*34	104.	7.1
12	*154	*43559E-02	*33522E-02	*77091E-02	*130	337.	*41	168.	6.51
13	*166	*37667E-02	*30703E-02	*68371E-02	*102	45.	*46	38.	6.01
14	*179	*17652E-02	*23306E-02	*40958E-02	*138	51.	*30	53.	5.58
15	*192	*25319E-02	*22775E-02	*45094E-02	*053	65.	*16	68.	5.21
16	*205	*12871E-02	*12394E-02	*25266E-02	*019	12.	*43	45.	4.88
17	*218	*81353E-01	*22619E-02	*30755E-02	*471	297.	*15	91.	4.60
18	*230	*27234E-02	*13437E-02	*46671E-02	*339	30.	*70	36.	4.34
19	*243	*16310E-02	*20324E-02	*36634E-02	*110	78.	*28	108.	4.11
20	*256	*19900E-02	*54781E-01	*25378E-02	*568	12.	*38	30.	3.91
21	*269	*13858E-02	*14154E-02	*28102E-02	*011	328.	*19	164.	3.72
22	*282	*10868E-02	*47780E-01	*15646E-02	*389	65.	*06	95.	3.55
23	*294	*12747E-02	*43023E-01	*17049E-02	*495	339.	*32	164.	3.40
24	*307	*60564E-01	*76536E-01	*13710E-02	*116	328.	*09	122.	3.26
25	*320	*73459E-01	*73432E-01	*14689E-02	*000	41.	*28	22.	3.13
26	*333	*70745E-01	*80669E-01	*15141E-02	*066	123.	*39	127.	3.00
27	*346	*58140E-01	*48094E-01	*10623E-02	*095	100.	*09	45.	2.89
28	*358	*39512E-01	*21781E-01	*61293E-01	*289	343.	*45	149.	2.79
29	*371	*45511E-01	*64797E-01	*11031E-02	*175	39.	*49	54.	2.69
30	*384	*74451E-01	*64865E-01	*13932E-02	*069	40.	*48	21.	2.60
31	*397	*29740E-01	*27847E-01	*57587E-01	*033	32.	*26	39.	2.52
32	*410	*43724E-01	*35847E-01	*79571E-01	*099	311.	*63	130.	2.44
33	*422	*95417E-01	*31840E-01	*12726E-02	*500	56.	*28	158.	2.32
34	*435	*36585E-01	*36571E-01	*73156E-01	*000	18.	*18	3.	2.30
35	*448	*36522E-01	*31013E-01	*67536E-01	*082	283.	*28	81.	2.23
36	*461	*40586E-01	*19466E-01	*60052E-01	*352	23.	*47	20.	2.17
37	*474	*65429E-01	*49503E-01	*11493E-02	*139	99.	*61	88.	2.11
38	*486	*11110E-01	*24023E-01	*35133E-01	*368	3.	*13	1.	3.7
39	*499	*61388E-01	*21080E-01	*82468E-01	*489	80.	*11	78.	2.06
40	*512	*35593E-01	*30876E-01	*64469E-01	*071	345.	*42	171.	1.95
41	*525	*41008E-01	*19307E-01	*60315E-01	*360	4.	*08	4.	4.1
42	*538	*22390E-01	*17632E-01	*40022E-01	*119	64.	*37	51.	1.86
43	*550	*18029E-01	*27466E-01	*45275E-01	*204	18.	*19	1.82	4.3

44	45	45	1.74	1.74	45	1.74	1.74
576	589	589	•26792E 01	•25382E 01	•15455E 01	•40877E 01	•36
46	47	47	•14691E 01	•3335E 01	•48426E 01	•393	17.
48	48	48	•28664E 01	•2035E 01	•49015E 01	•170	20.
49	49	49	•29771E 01	•11255E 01	•41026E 01	•451	298.
50	50	50	•16429E 01	•16637E 01	•36066E 01	•089	55.
51	51	51	•15643E 01	•27536E 01	•43179E 01	•025	50.
52	52	52	•666	•11772E 01	•25297E 01	•365	50.
53	53	53	•678	•18007E 01	•13873E 01	•130	320.
54	54	54	•691	•16243E 01	•20664E 01	•120	88.
55	55	55	•704	•17056E 01	•2561E 01	•201	63.
56	56	56	•717	•10790E 01	•10790E 01	•005	56.
57	57	57	•730	•23932E 01	•11934E 01	•35887E 01	325.
58	58	58	•742	•25341E 01	•15841E 01	•41182E 01	45.
59	59	59	•755	•19127E 01	•60262E 00	•25153E 01	107.
60	60	60	•768	•23842E 01	•90549E 00	•32897E 01	304.
61	61	61	•781	•13676E 01	•12773E 01	•049	41.
62	62	62	•794	•10205E 01	•52316E 00	•25840E 01	316.
63	63	63	•806	•10105E 01	•67617E 00	•15439E 01	45.
64	64	64	•819	•10759E 01	•10096E 01	•16866E 01	231.
65	65	65	•832	•12413E 01	•86972E 00	•20855E 01	107.
66	66	66	•845	•16259E 01	•11353E 01	•21111E 01	521.
67	67	67	•858	•13735E 01	•11132E 01	•27612E 01	316.
68	68	68	•870	•14442E 01	•16764E 01	•31205E 01	45.
69	69	69	•883	•35873E 00	•86408E 00	•12228E 01	290.
70	70	70	•896	•16602E 01	•96304E 00	•19752E 01	56.
71	71	71	•909	•13780E 01	•13494E 01	•26233E 01	413.
72	72	72	•922	•68750E 00	•11955E 01	•27274E 01	90.
73	73	73	•934	•90215E 00	•72014E 00	•1830E 01	359.
74	74	74	•947	•12287E 01	•74649E 00	•19752E 01	413.
75	75	75	•960	•20229E 01	•70224E 00	•27251E 01	90.
76	76	76	•973	•99112E 00	•87704E 00	•27251E 01	37.
77	77	77	•986	•63514E 00	•47738E 00	•18682E 01	97.
78	78	78	•998	•10450E 01	•45908E 00	•1125E 01	270.
79	79	79	•1.011	•10847E 01	•78630E 00	•18710E 01	359.
80	80	80	•1.024	•94780E 00	•75780E 00	•17056E 01	244.
81	81	81	•1.037	•59949E 00	•93845E 00	•15379E 01	33.
82	82	82	•1.050	•11334E 01	•83117E 00	•19646E 01	065.
83	83	83	•1.062	•11688E 01	•13311E 01	•19499E 01	55.
84	84	84	•1.075	•97064E 00	•64749E 00	•16181E 01	065.
85	85	85	•1.088	•95634E 00	•83683E 00	•17056E 01	24.
86	86	86	•1.101	•82847E 00	•50142E 00	•17056E 01	43.
87	87	87	•1.114	•91830E 00	•44842E 00	•15379E 01	53.
88	88	88	•1.126	•97334E 00	•10428E 01	•20161E 01	24.
89	89	89	•1.139	•71016E 00	•49187E 00	•12020E 01	323.
90	90	90	•1.152	•86167E 00	•72824E 00	•17932E 01	05.
91	91	91	•1.165	•44132E 00	•63502E 00	•13299E 01	336.
92	92	92	•1.178	•35048E 00	•47241E 00	•13667E 01	24.
93	93	93	•1.190	•97334E 00	•50075E 00	•10257E 01	320.
94	94	94	•1.203	•50188E 00	•86025E 00	•12020E 01	034.
95	95	95	•1.216	•70258E 00	•28967E 00	•15899E 01	338.
96	96	96	•1.229	•48514E 00	•58025E 00	•10654E 01	024.
97	97	97	•1.242	•71696E 00	•64279E 00	•13597E 01	055.
98	98	98	•1.254	•70982E 00	•79246E 00	•15023E 01	055.
99	99	99	•1.267	•68530E 00	•11981E 01	•8839E 01	272.
100	100	100	•1.280	•63625E 00	•81359E 00	•14499E 01	122.
101	101	101	•1.293	•10591E 01	•75498E 00	•18141E 01	168.
102	102	102	•1.306	•42269E 00	•51782E 00	•94051E 00	101.
103	103	103	•1.318	•68600E 00	•74977E 00	•14358E 01	347.

104	1.331	*11284E 01	*83960E 00	*19680E 01	*147	*41
105	1.344	*81619E 00	*45536E 00	*12716E 01	*284	*322
106	1.357	*57179E 00	*1135E 00	*11891E 01	*028	*23
107	1.370	*64940E 00	*11035E 01	*17529E 01	*028	*72
108	1.382	*70127E 00	*6246E 00	*13287E 01	*056	*53
109	1.395	*30689E 00	*82479E 00	*11317E 01	*458	*81
110	1.408	*62235E 00	*75384E 00	*13762E 01	*096	*304
111	1.421	*12061E 01	*43199E 00	*16380E 01	*473	*11
112	1.434	*42832E 00	*45515E 00	*88347E 00	*030	*8
113	1.446	*49184E 00	*52010E 00	*10119E 01	*028	*357
114	1.459	*44225E 00	*57404E 00	*10163E 01	*130	*302
115	1.472	*44301E 00	*68383E 00	*11268E 01	*214	*79
116	1.485	*85810E 00	*61437E 00	*14725E 01	*166	*74
117	1.498	*32880E 00	*47192E 00	*80672E 00	*179	*87
118	1.510	*43854E 00	*37465E 00	*81319E 00	*179	*49
119	1.523	*76222E 00	*51192E 00	*12741E 01	*196	*65
120	1.536	*49431E 00	*93986E 00	*14342E 01	*311	*65
121	1.549	*21468E 00	*30866E 00	*52335E 00	*180	*20
122	1.562	*75717E 00	*42538E 00	*11826E 01	*281	*306
123	1.574	*41178E 00	*80677E 00	*12186E 01	*324	*29
124	1.587	*74379E 00	*30848E 00	*10523E 01	*414	*31
125	1.600	*52416E 00	*40705E 00	*93121E 00	*126	*38
126	1.613	*37196E 00	*4181E 00	*78977E 00	*058	*68
127	1.626	*66478E 00	*47810E 00	*11429E 01	*163	*57
128	1.638	*48661E 00	*66878E 00	*11554E 01	*158	*332
129	1.651	*48490E 00	*72210E 00	*12070E 01	*197	*80
130	1.664	*35078E 00	*3074E 00	*65852E 00	*065	*94
131	1.677	*36389E 00	*26853E 00	*63242F 00	*151	*32
132	1.690	*31032E 00	*32038E 00	*63070E 00	*016	*289
133	1.702	*71435E 00	*29484E 00	*10092E 01	*416	*328
134	1.715	*79450E 00	*73463E 00	*15291E 01	*039	*47
135	1.728	*34674E 00	*33107E 00	*67781E 00	*023	*352
136	1.741	*47611E 00	*42501E 00	*90111E 00	*057	*289
137	1.754	*13223E 01	*62454E 00	*19469E 01	*358	*39
138	1.766	*77626E 00	*17852E 00	*95478E 00	*626	*10
139	1.779	*25763E 00	*45999E 00	*71762E 00	*282	*111
140	1.792	*43544E 00	*40438E 00	*40398E 00	*037	*81
141	1.805	*33538E 00	*35884E 00	*69422E 00	*034	*42
142	1.818	*53906E 00	*78272E 00	*13218E 01	*184	*78
143	1.830	*35400E 00	*54366E 00	*89767E 00	*211	*90
144	1.843	*56023E 00	*67419E 00	*12344E 01	*092	*33
145	1.856	*45580E 00	*42100E 00	*87680E 00	*040	*325
146	1.869	*46474E 00	*22762E 00	*69236E 00	*342	*54
147	1.882	*20923E 00	*28217E 00	*49140E 00	*148	*3
148	1.894	*34091E 00	*36155E 00	*70806E 00	*037	*68
149	1.907	*61195E 00	*41656E 00	*10285E 01	*190	*32
150	1.920	*44483E 00	*27525E 00	*72008E 00	*040	*86
151	1.933	*36998E 00	*31627E 00	*61762E 00	*225	*100
152	1.946	*49277E 00	*27469E 00	*68642E 00	*078	*91
153	1.958	*48336E 00	*37277E 00	*76746E 00	*284	*295
154	1.971	*25150E 00	*21657E 00	*85613E 00	*129	*299
155	1.984	*37838E 00	*23924E 00	*61762E 00	*075	*120
156	1.997	*43480E 00	*47917E 00	*91397E 00	*049	*316
157	2.010	*50615E 00	*39586E 00	*90201E 00	*122	*65
158	2.022	*25478E 00	*32800E 00	*58278E 00	*126	*102
159	2.035	*57221E 00	*44556E 00	*10178E 01	*124	*58
160	2.048	*51953E 00	*20457E 00	*72410E 00	*435	*54
161	2.061	*20974E 00	*35872E 00	*56846E 00	*262	*10
162	2.074	*48104E 00	*35939E 00	*84043E 00	*145	*77
163	2.086	*31843E 00	*47992E 00	*79835E 00	*202	*93

164	• 4708E	00	• 32493E	00	• 79580E	00	• 183
165	• 26309E	00	• 314866E	00	• 58176E	00	• 096
166	• 23652E	00	• 19470E	00	• 43121E	00	• 097
167	• 2138	00	• 54085E	00	• 87637E	00	• 234
168	• 2152	00	• 51963E	00	• 83455E	00	• 238
169	• 2163	00	• 30807E	00	• 53744E	00	• 146
170	• 2176	00	• 51069E	00	• 80855E	00	• 263
171	• 2189	00	• 18398E	00	• 30229E	00	• 46*
172	• 2202	00	• 59329E	00	• 28217E	00	• 46*
173	• 2214	00	• 22938E	00	• 30988E	00	• 8*
174	• 2227	00	• 33457E	00	• 21706E	00	• 142
175	• 2240	00	• 39138E	00	• 55173E	00	• 19
176	• 2253	00	• 22049E	00	• 22079E	00	• 170
177	• 2266	00	• 19736E	00	• 35924E	00	• 433
178	• 2278	00	• 16087E	00	• 19077E	00	• 85
179	• 2291	00	• 41708E	00	• 20978E	00	• 19
180	• 2304	00	• 22049E	00	• 57770E	00	• 448
181	• 2317	00	• 22550E	00	• 33253E	00	• 448
182	• 2330	00	• 33421E	00	• 35052E	00	• 024
183	• 2342	00	• 37213E	00	• 49073E	00	• 137
184	• 2355	00	• 35685E	00	• 22912E	00	• 597
185	• 2368	00	• 27124E	00	• 24934E	00	• 618
186	• 2381	00	• 22857E	00	• 33947E	00	• 039
187	• 2394	00	• 27506E	00	• 18555E	00	• 024
188	• 2406	00	• 47161E	00	• 22534E	00	• 69695E
189	• 2419	00	• 17384E	00	• 13172E	00	• 005
190	• 2432	00	• 23494E	00	• 12803E	00	• 001
191	• 2445	00	• 19774E	00	• 41636E	00	• 042
192	• 2458	00	• 49251E	00	• 24261E	00	• 196
193	• 2470	00	• 26935E	00	• 53248E	00	• 052
194	• 2483	00	• 19635E	00	• 27457E	00	• 461
195	• 2496	00	• 18786E	00	• 26955E	00	• 45741E
196	• 2509	00	• 13495E	00	• 38065E	00	• 084
197	• 2522	00	• 18968E	00	• 37589E	00	• 052
198	• 2534	00	• 13312E	00	• 30579E	00	• 3891E
199	• 2547	00	• 32869E	00	• 27483E	00	• 090
200	• 2560	00	• 29279E	00	• 37826E	00	• 67105E
201	• 2573	00	• 18387E	00	• 25502E	00	• 43889E
202	• 2586	00	• 25249E	00	• 24399E	00	• 49649E
203	• 2598	00	• 17370E	00	• 28239E	00	• 45609E
204	• 2611	00	• 20863E	00	• 47661E	00	• 68524E
205	• 2624	00	• 36852E	00	• 17984E	00	• 54835E
206	• 2637	00	• 17201E	00	• 16705E	00	• 015
207	• 2650	00	• 34409E	00	• 33253E	00	• 017
208	• 2662	00	• 53350E	00	• 14128E	00	• 67478F
209	• 2675	00	• 28349E	00	• 21566E	00	• 49914E
210	• 2688	00	• 16914E	00	• 16902E	00	• 3816E
211	• 2701	00	• 38042E	00	• 23263E	00	• 000
212	• 2714	00	• 13906E	00	• 24458E	00	• 38364E
213	• 2726	00	• 26071E	00	• 19023E	00	• 45095E
214	• 2739	00	• 25736E	00	• 18907E	00	• 136
215	• 2752	00	• 10372E	00	• 71030E	01	• 17475E
216	• 2765	00	• 26736E	00	• 33394E	00	• 61305E
217	• 2778	00	• 20696E	00	• 16531E	00	• 0111
218	• 2790	00	• 10162E	00	• 25568E	00	• 35730E
219	• 2803	00	• 20643E	00	• 24628E	00	• 45271E
220	• 2816	00	• 33276E	00	• 19294E	00	• 52570E
221	• 2829	00	• 20097E	00	• 39185E	00	• 59282E
222	• 2842	00	• 56321E-01	00	• 16109E	00	• 21741E
223	• 2854	00	• 17003E	00	• 34654E	00	• 51658E

224	2.867	11216E 00	*20391E 00	*100	*18
225	2.880	*22424E 00	*14831E 00	*100	*18
226	2.893	*18892E 00	*12249E 00	*204	*24
227	2.906	*13418E 00	*19175E 00	*204	*24
228	2.918	*11681E 00	*24103E 00	*311	*35
229	2.931	*17498E 00	*75744E 01	*311	*35
230	2.944	*16598E 00	*22010E 00	*311	*35
231	2.957	*17940E 00	*16142E 00	*311	*35
232	2.970	*17280E 00	*17200E 00	*311	*35
233	2.982	*22762E 00	*29384E 00	*311	*35
234	2.995	*19613E 00	*22744E 00	*311	*35
235	3.008	*22452E 00	*2941E 00	*311	*35
236	3.021	*20901E 00	*14622E 00	*311	*35
237	3.034	*18220E 00	*17076E 00	*311	*35
238	3.046	*10363E 00	*24973E 00	*311	*35
239	3.059	*23028E 00	*11371E 00	*311	*35
240	3.072	*97094E 01	*83843E 01	*311	*35
241	3.085	*20779E 00	*79814E 01	*311	*35
242	3.098	*38539E 00	*19410E 00	*311	*35
243	3.110	*20348E 00	*19477E 00	*311	*35
244	3.123	*16118E 00	*10409E 00	*311	*35
245	3.136	*20779E 00	*28716E 00	*311	*35
246	3.149	*40659E 00	*15399E 00	*311	*35
247	3.162	*27744E 00	*22489E 00	*311	*35
248	3.174	*20632E 00	*28477E 00	*311	*35
249	3.187	*22799E 00	*10853E 00	*311	*35
250	3.200	*37205E 00	*21751E 00	*311	*35
251	3.213	*17174E 00	*11210E 00	*311	*35
252	3.226	*14416E 00	*28956E 00	*311	*35
253	3.238	*33589E 00	*16246E 00	*311	*35
254	3.251	*17377E 00	*10896E 00	*311	*35
255	3.264	*22170E 00	*37765E 00	*311	*35
256	3.277	*26341E 00	*28902E 00	*311	*35
257	3.290	*37027E 00	*18629E 00	*311	*35
258	3.302	*28437E 00	*15921E 00	*311	*35
259	3.315	*43396E 00	*11715E 00	*311	*35
260	3.328	*11645E 00	*2937E 00	*311	*35
261	3.341	*15651E 00	*24664E 00	*311	*35
262	3.354	*11722E 00	*22462E 00	*311	*35
263	3.366	*14077E 00	*30394E 00	*311	*35
264	3.379	*27560E 00	*13943E 00	*311	*35
265	3.392	*18409E 00	*11290E 00	*311	*35
266	3.405	*40589E 00	*20543E 00	*311	*35
267	3.418	*12519E 00	*21500E 00	*311	*35
268	3.430	*35435E 00	*20551E 00	*311	*35
269	3.443	*20419E 00	*52451E 00	*311	*35
270	3.456	*25311E 00	*21093E 00	*311	*35
271	3.469	*27991E 00	*14350E 00	*311	*35
272	3.482	*60936E 01	*13571E 00	*311	*35
273	3.494	*14033E 00	*98894E 01	*311	*35
274	3.507	*38184E 00	*10895E 00	*311	*35
275	3.520	*20973E 00	*30079E 00	*311	*35
276	3.533	*30434E 00	*15045E 00	*311	*35
277	3.546	*15744E 00	*15567E 00	*311	*35
278	3.558	*86784E 01	*30170E 00	*311	*35
279	3.571	*13283E 00	*22276E 00	*311	*35
280	3.584	*21174E 00	*21174E 00	*311	*35
281	3.597	*27199E 00	*22534E 00	*311	*35
282	3.610	*89388E 01	*13580E 00	*311	*35
283	3.622	*11862E 00	*15050E 00	*311	*35

284	3.635	• 13317E 00	• 27054E 00	• 10040
285	3.648	• 12104E 00	• 25802E 00	• 890
286	3.661	• 15818E 00	• 10486E 00	• 361
287	3.674	• 77932E•01	• 10557E 00	• 203
288	3.686	• 16239E 00	• 98455E•01	• 26305E 00
289	3.699	• 65494E•01	• 11602E 00	• 18350E 00
290	3.712	• 12905E 00	• 13449E 00	• 15526E 00
291	3.725	• 11445E 00	• 11225E 00	• 22670E 00
292	3.738	• 16676E 00	• 21336E 00	• 38012E 00
293	3.750	• 16274E 00	• 16060E 00	• 25106E 00
294	3.763	• 11266E 00	• 16979E 00	• 28466E 00
295	3.776	• 15577E 00	• 10728E 00	• 26354E 00
296	3.789	• 24179E 00	• 17862E 00	• 42042E 00
297	3.802	• 18134E 00	• 69720E•01	• 25166E 00
298	3.814	• 12501E 00	• 15812E 00	• 28313E 00
299	3.827	• 15431E 00	• 11000E 00	• 27131E 00
300	3.840	• 10728E 00	• 50517E•01	• 15779E 00
301	3.853	• 17390E 00	• 68916E•01	• 11225E 00
302	3.866	• 21963E 00	• 86408E•01	• 24282E 00
303	3.878	• 88626E•01	• 19304E 00	• 36048E 00
304	3.891	• 31884E 00	• 12204E 00	• 44088E 00
305	3.904	• 45306E•01	• 15318E 00	• 19849E 00
306	3.917	• 78876E•01	• 13070E 00	• 20957E 00
307	3.930	• 18245E 00	• 21338E 00	• 39583E 00
308	3.942	• 17434E 00	• 10528E 00	• 28262E 00
309	3.955	• 12876E 00	• 11107E 00	• 23983E 00
310	3.968	• 11312E 00	• 96685E•01	• 15318E 00
311	3.981	• 78769E•01	• 20283E 00	• 20860E 00
312	3.994	• 67039E•01	• 21365E 00	• 28609E 00
313	4.006	• 21186E 00	• 21770E 00	• 42956E 00
314	4.019	• 16129E 00	• 23954E 00	• 40083E 00
315	4.032	• 10752E 00	• 79263E•01	• 18678E 00
316	4.045	• 91681E•01	• 71266E•01	• 16295E 00
317	4.058	• 10310E 00	• 16594E 00	• 26903E 00
318	4.070	• 19447E 00	• 93281E•01	• 28775E 00
319	4.083	• 98512E•01	• 50988E•01	• 14950E 00
320	4.096	• 17951E 00	• 11393E 00	• 29345E 00
321	4.109	• 20847E 00	• 75646E•01	• 18411E 00
322	4.122	• 19333E 00	• 10388E 00	• 29721E 00
323	4.134	• 96625E•01	• 89926E•01	• 18655E 00
324	4.147	• 16087E 00	• 13185E 00	• 29272E 00
325	4.160	• 15703F 00	• 17807E 00	• 23510E 00
326	4.173	• 23767E 00	• 25069E 00	• 28436E 00
327	4.186	• 69893E•01	• 25767E 00	• 32757E 00
328	4.198	• 27319E 00	• 11263E 00	• 38582E 00
329	4.211	• 74428E•01	• 14423E 00	• 22666E 00
330	4.224	• 15237E 00	• 12456E 00	• 27693E 00
331	4.237	• 85140E•01	• 98341E•01	• 18348E 00
332	4.250	• 16608E 00	• 12511E 00	• 19042E 00
333	4.262	• 17678E 00	• 12701E 00	• 30379E 00
334	4.275	• 13836E 00	• 12559E 00	• 26394E 00
335	4.288	• 18640E 00	• 73293E•01	• 25970E 00
336	4.301	• 66371E•01	• 11405E 00	• 19402E 00
337	4.314	• 11797E 00	• 71940E•01	• 29119E 00
338	4.326	• 13678E 00	• 13343E 00	• 19991E 00
339	4.339	• 77387E•01	• 86630E•01	• 16402E 00
340	4.352	• 11361E 00	• 76195E•01	• 19808E 00
341	4.365	• 58686E•01	• 95095E•01	• 15378E 00
342	4.378	• 23291E 00	• 13217E 00	• 36507E 00
343	4.390	• 82690E•01	• 13820E 00	• 22089E 00

21:59 APR 28, 1977

A1 = 5923856.25
A2 = 5923856.25

EAST
NORTH
START
START
760220 190028
760220 190028

SPECTRUM OF SERIES WITH 4500 POINTS DIVIDED INTO 9 PIECES WITH 5000 POINTS IN EACH PIECE.
2500 ESTIMATES AVERAGED OVER 1 ADJACENT FREQUENCY BANDS TO GIVE 2500 AVERAGED ESTIMATES.
SPECTRUM UNITS: (MM/S)
UNITS OF TIME (T.U.) ARE HOURS
ORIENTATIONS ARE CLOCKWISE FROM NORTH

ESTIMATE NUMBER	FREQUENCY CYCLES/T.U.	CLOCKWISE SPECTRUM	ANTI-CLOCKWISE SPECTRUM	TOTAL SPECTRUM	RATIARY COEFFICIENT	ELLIPSE ORIENTATION	ELLIPSE STABILITY	MEAN ORIENTATION	PERIOD T.U./CYCLE	ESTIMATE NUMBER
0	.000	*17593E-10	*17593E-10	*17593E-10	*000	57.	*80	*56.	*30	3
1	.013	*94566E 03	*13964E 04	*23621E 04	*182	34.	*86	*39.	*13	1
2	.026	*19519E 03	*20454E 03	*39973E 03	*023	96.	*18	*94.	*06	2
3	.038	*46254E 03	*33868E 03	*80122E 03	*155	15.	*67	*23.	*04	3
4	.051	*71893E 02	*63966E 02	*13586F 03	*058	38.	*05	*14.	*53	4
5	.064	*54293E 02	*93613E 02	*14791E 03	*266	9.	*63	*13.	*63	5
6	.077	*35631E 03	*30292E 03	*65922E 03	*081	24.	*46	*4.	*02	6
7	.090	*24368E 03	*11290E 03	*35658E 03	*367	320.	*25	*100.	*16	7
8	.102	*14749E 03	*32421E 02	*17991E 03	*640	71.	*15	*13.	*77	8
9	.115	*49883E 02	*22545E 02	*72428E 02	*377	83.	*18	*67.	*68	9
10	.128	*42596E 02	*18923E 02	*61520E 02	*385	61.	*36	*63.	*81	10
11	.141	*46023E 02	*37906E 02	*83929E 02	*097	307.	*07	*98.	*10	11
12	.154	*57225E 02	*38822E 02	*96047E 02	*192	328.	*15	*49.	*51	12
13	.166	*26642E 02	*27852E 02	*54515E 02	*022	358.	*36	*6.	*01	13
14	.179	*52538E 02	*12998E 02	*65536E 02	*603	77.	*35	*62.	*58	14
15	.192	*21066E 02	*10206E 02	*31272E 02	*347	28.	*36	*63.	*21	15
16	.205	*10256E 02	*15641E 02	*25897E 02	*208	34.	*30	*29.	*38	16
17	.218	*18154E 02	*17300E 02	*35454E 02	*024	20.	*05	*127.	*50	17
18	.230	*14174E 02	*12112E 02	*26286E 02	*078	47.	*20	*71.	*34	18
19	.243	*21235E 02	*10661E 02	*31896E 02	*332	30.	*43	*36.	*11	19
20	.256	*89937E 01	*64263E 01	*15426E 02	*167	3.	*29	*163.	*91	20
21	.269	*96553E 01	*10639E 02	*20294E 02	*048	22.	*31	*42.	*72	21
22	.282	*13444E 02	*89022E 01	*22396E 02	*201	297.	*25	*90.	*55	22
23	.294	*93070E 01	*42332E 01	*13540F 02	*375	300.	*08	*99.	*40	23
24	.307	*57262E 01	*11472E 02	*17199F 02	*334	11.	*65	*14.	*26	24
25	.320	*87134E 01	*87440E 01	*17457E 02	*52.	52.	*24	*54.	*13	25
26	.333	*55916E 01	*62379E 01	*11830E 02	*005	15.	*13	*15.	*00	26
27	.346	*86871E 01	*21438E 01	*16831E 02	*604	301.	*17	*195.	*00	27
28	.358	*82981E 01	*43211E 01	*12619E 02	*315	349.	*29	*65.	*79.	28
29	.371	*11959E 02	*61013E 01	*18061E 02	*324	34.	*50	*42.	*69	29
30	.384	*10270E 02	*90098E 01	*19280E 02	*065	64.	*52	*71.	*50	30
31	.397	*41734E 01	*28833E 01	*75567E 01	*183	45.	*26	*41.	*52	31
32	.410	*53798E 01	*63324E 01	*11712E 02	*081	3.	*62	*170.	*44	32
33	.422	*28937E 01	*44885L 01	*73822F 01	*216	48.	*29	*65.	*37	33
34	.435	*76924E 01	*44691E 01	*12162F 02	*265	25.	*31	*44.	*30	34
35	.448	*43292E 01	*37539E 01	*80821E 01	*071	51.	*39	*42.	*23	35
36	.461	*37444E 01	*23379E 01	*61023E 01	*227	8.	*30	*12.	*17	36
37	.474	*56379E 01	*19664E 01	*76043E 01	*483	35.	*26	*59.	*11.	37
38	.486	*39724E 01	*30822E 01	*70545F 01	*126	48.	*21	*47.	*26	38
39	.499	*24332E 01	*24116E 01	*42499F 01	*005	48.	*37	*44.	*26	39
40	.512	*27160E 01	*21116E 01	*4276E 01	*125	58.	*77	*60.	*25	40
41	.525	*30036E 01	*28881E 01	*58917E 01	*020	53.	*31	*53.	*95	41
42	.538	*59136E 01	*26044E 01	*85249E 01	*389	3.	*41	*6.	*86	42
43	.551	*35820E 01	*22331E 01	*58151E 01	*232	27.	*12	*59.	*82	43

•563	•26665E 01	•29/83E 01	•56448E 01	•055	178
•574	•33973E 01	•32954E 01	•66857E 01	•014	174
46	•23742E 01	•16201E 01	•33944E 01	•189	174
47	•26367E 01	•46762E 01	•46762E 01	•128	170
48	•20395E 01	•15225E 01	•32097E 01	•051	166
49	•16872E 01	•22612E 01	•46814E 01	•034	163
50	•24262E 01	•21142E 01	•41952E 01	•331	163
51	•14023E 01	•27429E 01	•41952E 01	•79	159
52	•640	•1963E 01	•13985E 01	•33639E 01	156
53	•653	•1963E 01	•11064E 01	•37295F 01	153
54	•666	•31260E 01	•12017E 01	•43277E 01	149
55	•730	•13383E 01	•18008E 01	•31391E 01	147
56	•742	•21012E 01	•16253E 01	•37948E 01	147
57	•755	•19918E 01	•96551E 00	•41965E 01	147
58	•768	•18604E 01	•12267E 01	•22587E 01	145
59	•774	•126241E 01	•11447E 01	•24000E 01	142
60	•781	•12553E 01	•10521E 01	•20674E 01	140
61	•794	•10153E 01	•85253E 00	•28203E 01	137
62	•806	•53203E 00	•85253E 00	•347	135
63	•814	•18539E 01	•11178E 01	•30872E 01	132
64	•832	•98348E 00	•12240E 01	•24000E 01	130
65	•845	•84562E 00	•10561E 01	•2205E 01	128
66	•858	•24661E 01	•18404E 01	•43065E 01	126
67	•922	•9905E 00	•97247E 00	•19625E 01	124
68	•934	•14030E 01	•152548E 01	•31785E 01	124
69	•947	•17089E 01	•15332E 01	•32420E 01	122
70	•896	•94485E 00	•12156E 01	•21601E 01	120
71	•909	•84562E 00	•10561E 01	•19017E 01	119
72	•922	•99186E 00	•97247E 00	•19625E 01	119
73	•934	•14030E 01	•84562E 00	•22486E 01	117
74	•947	•18610E 01	•15332E 01	•32420E 01	115
75	•961	•15687E 01	•93669E 00	•21260E 01	113
76	•972	•15694E 01	•83833E 00	•24077E 01	111
77	•986	•53136E 00	•10860E 01	•16173E 01	110
78	•998	•72374E 00	•99186E 00	•17156E 01	109
79	•1.011	•45584E 00	•10406E 01	•14965E 01	108
80	•1.024	•66387E 00	•12107E 01	•19345E 01	107
81	•1.037	•10476E 01	•61973E 00	•24077E 01	106
82	•1.059	•87211E 00	•29592E 00	•11680E 01	105
83	•1.062	•1.772E 01	•66413E 00	•20373E 01	104
84	•1.075	•78710E 00	•65023E 00	•14373E 01	103
85	•1.088	•41896E 00	•47311E 00	•89207E 00	102
86	•1.101	•10293E 01	•68595E 00	•12107E 01	101
87	•1.114	•84332E 00	•60475E 00	•1478E 01	100
88	•1.126	•83431E 00	•58711E 00	•14220E 01	99
89	•1.139	•65280E 00	•68870E 00	•13415E 01	98
90	•1.152	•10530E 01	•91619E 00	•19692E 01	97
91	•1.165	•10038E 01	•68526E 00	•16891E 01	96
92	•1.178	•90816E 00	•48762E 00	•1478E 01	95
93	•1.190	•10647E 01	•10076E 01	•20723E 01	94
94	•1.203	•65340E 00	•47816E 00	•13415E 01	93
95	•1.216	•46559E 00	•66825E 00	•19692E 01	92
96	•1.229	•53763E 00	•53078E 00	•16844E 01	91
97	•1.242	•11681E 01	•48762E 00	•13958E 01	90
98	•1.254	•68963E 00	•54206E 00	•12387E 01	89
99	•1.267	•79651E 00	•54915E 00	•13457E 01	88
100	•1.280	•37044E 00	•51179E 00	•82224E 01	87
101	•1.293	•84871E 00	•44888E 00	•12976E 01	86
102	•1.306	•45866E 00	•61053E 00	•1692E 01	85
103	•1.318	•72702E 00	•41215E 00	•11392E 01	84

104	1.331	• 51272E 00	• 74583E 00	• 12585E 01	• 1.85
105	1.344	• 51462E 00	• 40421E 00	• 9183F 00	• 1.20
106	1.357	• 75942E 00	• 61608E 00	• 13755E 01	• 1.04
107	1.370	• 51464E 00	• 69703E 00	• 12117E 01	• 1.51
108	1.382	• 90331E 00	• 565665E 00	• 14690E 01	• 88.
109	1.395	• 30932E 00	• 61480E 00	• 9412E 00	• 46.
110	1.408	• 67751E 00	• 35390E 00	• 1n314E 01	• 341.
111	1.421	• 33035E 00	• 5/275E 00	• 90360F 00	• 56.
112	1.434	• 42647E 00	• 34124E 00	• 7771E 00	• 122
113	1.446	• 49044E 00	• 55072E 00	• 10414E 01	• 058
114	1.459	• 67801E 00	• 67314E 00	• 1n83E 01	• 27.
115	1.472	• 44217E 00	• 46077E 00	• 11388E 01	• 46.
116	1.485	• 99210E 00	• 16299E 00	• 9n497E 00	• 191
117	1.498	• 45215E 00	• 4224E 00	• 60516E 00	• 461
118	1.510	• 46008E 00	• 57/09E 00	• 14193E 01	• 359.
119	1.523	• 72155E 00	• 72865E 00	• 94841E 00	• 217
120	1.536	• 61632E 00	• 28865E 00	• 1n83E 01	• 237
121	1.549	• 68242E 00	• 51155E 00	• 9n497E 00	• 362
122	1.562	• 45215E 00	• 28815E 00	• 11940E 01	• 143
123	1.574	• 30932E 00	• 34497E 00	• 74020E 00	• 221
124	1.587	• 28003E 00	• 38778E 00	• 93954E 00	• 217
125	1.600	• 46774E 00	• 36947E 00	• 14503E 01	• 005
126	1.613	• 36882E 00	• 29513E 00	• 66780E 00	• 161
127	1.626	• 30932E 00	• 34497E 00	• 66780E 00	• 161
128	1.638	• 52454E 00	• 28418E 00	• 80872E 00	• 297
129	1.651	• 33901E 00	• 47657E 00	• 81558E 00	• 297
130	1.664	• 45157E 00	• 46/32E 00	• 91889E 00	• 117
131	1.677	• 44797E 00	• 42518E 00	• 87315E 00	• 117
132	1.690	• 25536E 00	• 24272E 00	• 65638E 00	• 117
133	1.702	• 35581E 00	• 35346E 00	• 70928E 00	• 003
134	1.715	• 24242E 00	• 64545E 00	• 88787E 00	• 046
135	1.728	• 35945E 00	• 82106E 00	• 11805E 01	• 391
136	1.741	• 31255E 00	• 31666E 00	• 62921E 00	• 007
137	1.754	• 38865E 00	• 2819E 00	• 49858E 00	• 026
138	1.766	• 89339E 00	• 39819E 00	• 7584E 00	• 053
139	1.779	• 31101E 00	• 23117E 00	• 12817E 01	• 379
140	1.792	• 34078E 00	• 36/48E 00	• 54218E 00	• 147
141	1.805	• 47130E 00	• 49126E 00	• 70825E 00	• 038
142	1.818	• 40845E 00	• 27818E 00	• 62921E 00	• 007
143	1.830	• 37136E 00	• 34252E 00	• 86638E 00	• 109.
144	1.843	• 49638E 00	• 32989E 00	• 82672E 00	• 150.
145	1.856	• 23950E 00	• 30246E 00	• 54196E 00	• 202
146	1.869	• 26257E 00	• 25430E 00	• 96256F 00	• 021
147	1.882	• 33726E 00	• 27404E 00	• 61133E 00	• 196.
148	1.894	• 37136E 00	• 30373E 00	• 67558E 00	• 043
149	1.907	• 16094E 00	• 31277E 00	• 47371E 00	• 101
150	1.920	• 20821E 00	• 58909E 00	• 82672E 00	• 202
151	1.933	• 43651E 00	• 25430E 00	• 54196E 00	• 116
152	1.946	• 26742E 00	• 17707E 00	• 51687F 00	• 016
153	1.958	• 41925E 00	• 25316E 00	• 6133E 00	• 365
154	1.971	• 26426E 00	• 20994E 00	• 67242E 00	• 247
155	1.984	• 39997E 00	• 33/56E 00	• 47371E 00	• 115
156	1.997	• 20022E 00	• 1714E 00	• 73752E 00	• 085
157	2.010	• 47752E 00	• 28449E 00	• 44449F 00	• 203
158	2.022	• 22411E 00	• 25229E 00	• 47639F 00	• 059
159	2.035	• 23016E 00	• 30270E 00	• 53286E 00	• 136
160	2.048	• 13498E 00	• 49181E 00	• 62679F 00	• 569.
161	2.061	• 48955E 00	• 26517E 00	• 75471E 00	• 297
162	2.074	• 32049E 00	• 18561E 00	• 56609F 00	• 344
163	2.086	• 29347E 00	• 1155E 00	• 41102F 00	• 428
					• 37.

164	•254922E 00	•342/1E 00	•67192E 00	•1139	•143•	•33
165	•29570E 00	•23042E 00	•13942E 00	•4426E 00	•110	•57•
166	•30436E 00	•13942E 00	•4426E 00	•372	•38•	•14
167	•23495E 00	•21/63E 00	•45659E 00	•047	•356•	•176•
168	•36087E 00	•14679E 00	•50766E 00	•422	•352•	•50•
169	•22398E 00	•15887E 00	•38286E 00	•170	•58•	•48•
170	•27717E 00	•28/12E 00	•54429E 00	•018	•314•	•19•
171	•19578E 00	•23993E 00	•43601E 00	•101	•40•	•33
172	•28489E 00	•33053E 00	•61541E 00	•074	•74•	•35•
173	•23895E 00	•26600E 00	•50489E 00	•054	•11•	•54•
174	•26575E 00	•96547E 01	•36160E 00	•466	•64•	•40•
175	•19425E 00	•29835E 00	•43261E 00	•211	•37•	•31•
176	•11825E 00	•16626E 00	•28451E 00	•169	•17•	•22•
177	•26069E 00	•16395E 00	•42108E 00	•238	•76•	•35•
178	•28131E 00	•42784E 00	•40505E 00	•339	•313•	•70•
179	•83192E-01	•18261E 00	•26574E 00	•374	•56•	•25•
180	•22576E 00	•20671E 00	•43176E 00	•042	•59•	•22•
181	•26270E 00	•17093E 00	•43363E 00	•212	•340•	•29•
182	•36635E 00	•20378E 00	•57064E 00	•286	•95•	•47•
183	•99283E-01	•42612E 00	•52540E 00	•622	•20•	•19•
184	•22929E 00	•16196E 00	•39125E 00	•172	•95•	•19•
185	•24073E 00	•10823E 00	•34855E 00	•379	•23•	•19•
186	•19712E 00	•19221E 00	•38933E 00	•013	•41•	•35•
187	•14361E 00	•28393E 00	•42753E 00	•328	•300•	•28•
188	•32768E 00	•18160E 00	•50928E 00	•287	•78•	•33•
189	•17049E 00	•12041E 00	•29136E 00	•173	•37•	•29•
190	•16077E 00	•23170E 00	•39257E 00	•180	•8•	•46•
191	•31940E 00	•16762E 00	•48701E 00	•312	•354•	•20•
192	•16978E 00	•21425E 00	•35403E 00	•116	•56•	•29•
193	•19580E 00	•17253E 00	•36833E 00	•063	•23	•59•
194	•16749E 00	•15902E 00	•32652E 00	•026	•44•	•32•
195	•2496	•17046E 00	•35539E 00	•179	•31•	•47•
196	•22041E 00	•17086E 00	•39127E 00	•127	•83•	•64•
197	•24953E 00	•16632E 00	•41585E 00	•200	•19•	•45•
198	•96916E-01	•20853E 00	•30544E 00	•365	•47•	•47•
199	•21845E 00	•19359E 00	•41204E 00	•060	•300•	•26•
200	•14024E 00	•13235E 00	•27259E 00	•029	•295•	•20•
201	•11522E-01	•95532E-01	•21075E 00	•093	•71•	•10•
202	•15711E 00	•12525E 00	•28226E 00	•113	•31•	•37•
203	•18748E 00	•21814E 00	•40562E 00	•076	•322•	•30•
204	•13198E 00	•20885E 00	•34083E 00	•226	•34•	•52•
205	•29374E 00	•24144E 00	•53517E 00	•098	•36•	•15•
206	•29171E 00	•10322E 00	•39424F 00	•476	•305•	•19•
207	•16724E 00	•22056E 00	•38780E 00	•137	•05•	•22•
208	•22890E 00	•14486E 00	•40525E 00	•078	•9•	•45•
209	•12830E 00	•15958E 00	•33032E 00	•026	•223	•17•
210	•12318E 00	•16927E 00	•29245E 00	•158	•26•	•23•
211	•17679E 00	•12434E 00	•30043E 00	•172	•6•	•32•
212	•94730E-01	•14747E 00	•23547E 00	•195	•72•	•19•
213	•16235E 00	•16924E 00	•31577E 00	•302	•41•	•38•
214	•22890E 00	•14486E 00	•32285E 00	•223	•47•	•21•
215	•12830E 00	•15958E 00	•28788E 00	•109	•90•	•19•
216	•11472E 00	•18345E 00	•29817E 00	•230	•38•	•35•
217	•20573E 00	•11012E 00	•31577E 00	•56•	•302•	•21•
218	•19893E 00	•19404E 00	•39587E 00	•021	•93•	•62•
219	•60466E-01	•12346E 00	•18393E 00	•342	•107•	•41•
220	•2803	•16011E 00	•40991E 00	•269	•356•	•21•
221	•2816	•20533E 00	•38483E 00	•67	•302•	•23•
222	•2824	•15139E 00	•19792E 00	•133	•97•	•28•
223	•2842	•83494E-01	•22949E 00	•466	•113•	•106•
224	•2654	•21476E 00	•16081E 00	•51•	•51•	•44•

224	2.867	*14163E 00	*87592E -01	*236	•64
225	2.887	*12461E 00	*85/81E -01	62*	•35
226	2.893	*11114E 00	*12609E 00	49*	•44
227	2.906	*10519E 00	*10310E 00	49*	•46
228	2.918	*26313E 00	*1/215E 00	377*	•35
229	2.931	*11880E 00	*1/415E 00	54*	•35
230	2.944	*24354E 00	*90/65E -01	26*	•34
231	2.957	*76274E -01	*12078E 00	26*	•34
232	2.970	*17583E 00	*12660E 00	25*	•34
233	2.982	*20658E 00	*73828E -01	25*	•34
234	2.995	*68732E -01	*16489E 00	26*	•34
235	3.008	*14292E 00	*19439E 00	26*	•34
236	3.021	*13678E 00	*16416E 00	27*	•34
237	3.034	*21734E 00	*13937E 00	27*	•34
238	3.046	*22622E 00	*12698E 00	27*	•34
239	3.059	*14653E 00	*15955E 00	27*	•34
240	3.072	*9787E -01	*22240E 00	27*	•34
241	3.085	*14587E 00	*13283E 00	27*	•34
242	3.098	*77648E -01	*18221E 00	27*	•34
243	3.111	*12446E 00	*20871E 00	27*	•34
244	3.123	*22738E 00	*13814E 00	27*	•34
245	3.136	*17923E 00	*19698E 00	27*	•34
246	3.149	*20745E 00	*15925E 00	27*	•34
247	3.162	*19832E 00	*1/964E 00	27*	•34
248	3.174	*72198E -01	*17098E 00	27*	•34
249	3.187	*12396E 00	*10823E 00	27*	•34
250	3.200	*13627E 00	*13790E 00	27*	•34
251	3.213	*14042E 20	*15985E 00	27*	•34
252	3.226	*23138E 00	*20191E 00	27*	•34
253	3.238	*16618E 00	*15296E 00	27*	•34
254	3.251	*26966E 00	*11347E 00	27*	•34
255	3.264	*76147E -01	*12204E 00	27*	•34
256	3.277	*32980E 00	*19911E 00	27*	•34
257	3.290	*10670E 00	*14670E 00	27*	•34
258	3.302	*13875E 00	*5967E -01	27*	•34
259	3.315	*15232E 00	*10268E 00	27*	•34
260	3.328	*17743E 00	*16141E 00	27*	•34
261	3.341	*11790E 00	*16215E 00	27*	•34
262	3.354	*11549E 00	*3252E -01	27*	•34
263	3.366	*10076E 00	*10001E 00	27*	•34
264	3.379	*86823E -01	*16259E 00	27*	•34
265	3.392	*17699E 00	*2420E 00	27*	•34
266	3.405	*14878E 00	*15109E 00	27*	•34
267	3.418	*22464E 00	*14470E 00	27*	•34
268	3.430	*13675F 00	*16861E 00	27*	•34
269	3.443	*86823E -01	*16259E 00	27*	•34
270	3.456	*11923E 00	*1959E 00	27*	•34
271	3.469	*90116E -01	*12812E 00	27*	•34
272	3.482	*15221E 00	*63508E -01	27*	•34
273	3.494	*14616E 00	*12981E 00	27*	•34
274	3.507	*12327E 00	*82163E -01	27*	•34
275	3.520	*13730E 00	*13650E 00	27*	•34
276	3.533	*34376E 00	*12851E 00	27*	•34
277	3.546	*13321E 00	*52805E -01	27*	•34
278	3.558	*10573F 00	*11172E 00	27*	•34
279	3.571	*14541E 00	*89/28E -01	27*	•34
280	3.584	*19370E 00	*21482E 00	27*	•34
281	3.597	*90852E -01	*58/93E -01	27*	•34
282	3.610	*94378E -01	*58/15E -01	27*	•34
283	3.622	*19572E 00	*1107E 00	27*	•34

3.635	•11677E 00	•9/135E-01	•21321F 00	•089
2.845	•10543E 00	•14426E 00	•24969E 00	•156
3.648	•10157E 00	•10/99E 00	•20955E 00	•031
2.85	•13710E 00	•/9569E-01	•21667E 00	•256
3.661	•12074E 00	•15564E 00	•21638E 00	•126
2.87	•17046E 00	•10972E 00	•28017E 00	•217
3.674	•17097E 00	•919/5E-01	•24145E 00	•238
2.88	•14947E 00	•50408E-01	•14539E 00	•307
3.686	•94930E-01	•69202E-01	•17334E 00	•198
2.89	•3.725	•10344E 00	•21568E 00	•137
2.90	•15648E 00	•86083E-01	•24256E 00	•050
3.699	•17020E 00	•10920E 00	•21629E 00	•010
2.91	•14947E 00	•919/5E-01	•24145E 00	•238
2.92	•12244E 00	•93044E-01	•21568E 00	•137
2.93	•94218E-01	•10408E 00	•19830E 00	•050
2.94	•89430E-01	•/3400E-01	•16253E 00	•098
2.95	•97160E-01	•17643E 00	•27359E 00	•125
2.96	•52472E-01	•/0/99E-01	•12327E 00	•149
2.97	•3.789	•12244E 00	•22260E 00	•158
3.802	•12030E 00	•692/6E-01	•19018E 00	•271
2.98	•8.14	•55661E-01	•19444E 00	•180
2.99	•3.827	•10878E 00	•68617E-01	•327
3.00	•3.840	•19343E 00	•15473E 00	•34817E 00
3.01	•3.853	•12890E 00	•93/01E-01	•111
3.02	•3.866	•12030E 00	•692/6E-01	•111
3.03	•3.878	•10878E 00	•55661E-01	•111
3.04	•3.891	•13544E 00	•68617E-01	•115
3.05	•3.904	•93872E-01	•60603E-01	•20406E 00
3.06	•3.917	•14499E 00	•10293E 00	•24783E 00
3.07	•3.930	•67387E-01	•15245E 00	•21984E 00
3.08	•3.942	•75254E-01	•60/60E-01	•13601E 00
3.09	•3.955	•10086E 00	•49/40E-01	•15060E 00
3.10	•3.968	•83832E-01	•88329E-01	•26448E 00
3.11	•3.981	•11371E 00	•13611E 00	•24982E 00
3.12	•3.994	•16400E 00	•68287E-01	•23229E 00
3.13	•4.006	•13718E 00	•74/74E-01	•21195E 00
3.14	•4.019	•28635E-01	•41814E-01	•70450F-01
3.15	•4.032	•11956E 00	•14/29E 00	•88294E-01
3.16	•4.045	•17041E 00	•97807E-01	•17041E 00
3.17	•4.058	•11044E 00	•12335E 00	•23419E 00
3.18	•4.070	•83011E-01	•55034E-01	•13805E 00
3.19	•4.083	•14149E 00	•11428E 00	•25577E 00
3.20	•4.096	•11057E 00	•12029E 00	•23086E 00
3.21	•4.109	•14692E 00	•66866E-01	•21379E 00
3.22	•4.122	•12693E 00	•41546E-01	•16848E 00
3.23	•4.134	•12277E 00	•85497E-01	•20777E 00
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3.26	•4.173	•86987E-01	•15/45E 00	•24444E 00
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3.40	•4.352	•75936E-01	•13220E 00	•20213E 00
3.41	•4.365	•89693E-01	•10213E 00	•19179F 00
3.42	•4.378	•97961E-01	•74879E-01	•17284E 00
3.43	•4.391	•91538E-01	•59571E-01	•15117F 00

Variable vs. Time Plots

The current and temperature data are plotted in a variety of ways. Included are both averaged and filtered data. A one hour average refers to a series with one point per hour, that point being the vector average of the basic series over that hour for speed, or the scalar average for temperature. To obtain the Gaussian filtered series, the one hour averaged series was passed through a Gaussian filter with a half width of one day and the resulting series subsampled at one per day.

The plots are:

- p. 83 - Record 5921 plotted as a one hour averaged series and as a Gaussian filtered series. The length of a "stick" is proportional to speed, its direction corresponds to geographic direction (magnetic deviation has been applied). The direction of north is indicated.
- pp. 84-93 - Line plots of the one hour averaged version of all variables for all the records.
- p. 94 - A composite stick plot of the Gaussian filtered velocities.
- p. 95 - A day-by-day composite of the Gaussian filtered vectors with the "sticks" arranged by depth.
- p. 96 - A composite line plot of the one hour averaged north components.
- p. 97 - A composite line plot of the one hour averaged east components.
- p. 98 - A composite line plot of the one hour averaged speeds.
- p. 99 - A composite of the Gaussian filtered temperatures.
- pp. 100-117 - Expanded scalar line plots of east, north and temperature for selected segments of basic series.

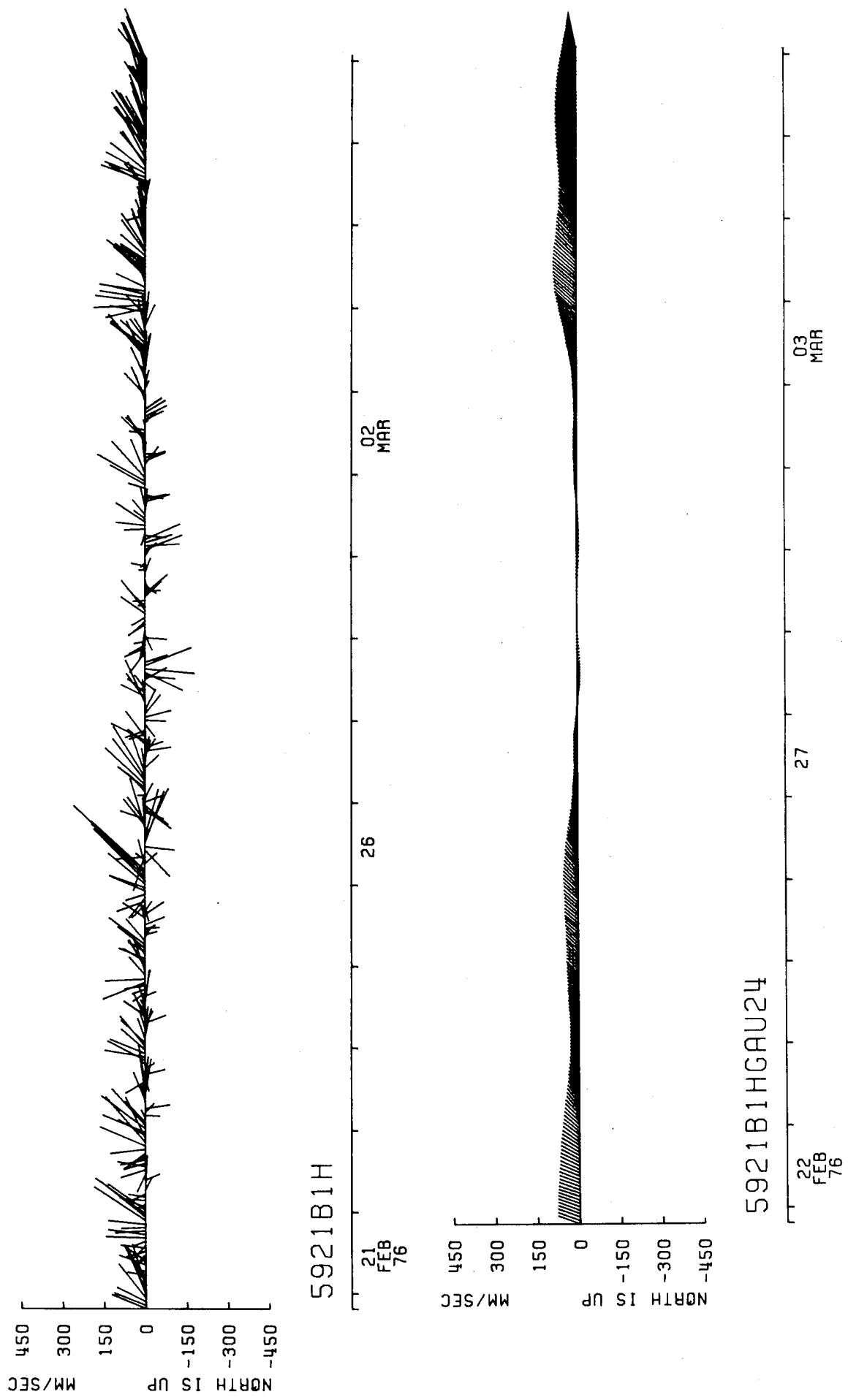
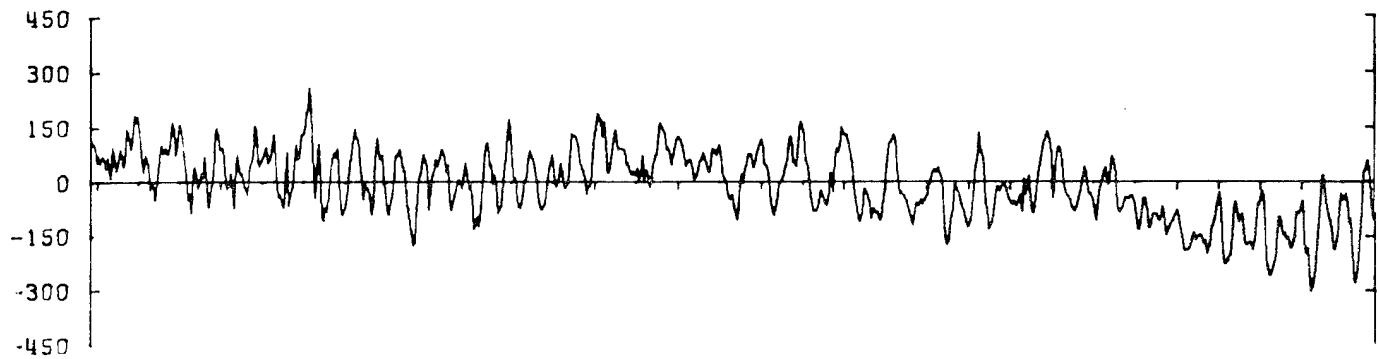
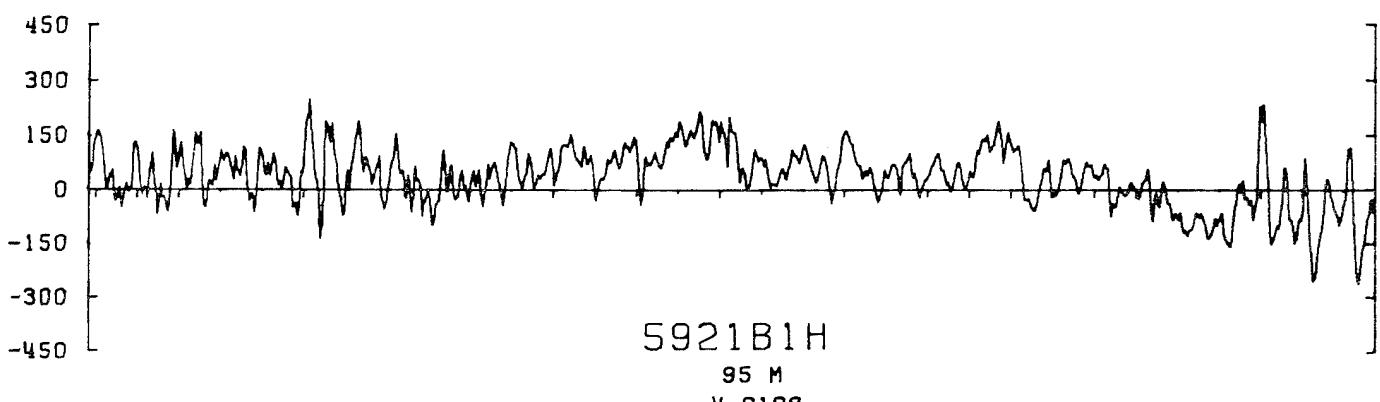


Figure 4. Stick plots of the 1 hour Gaussian filtered data and the 1 hour averaged data for 5921.



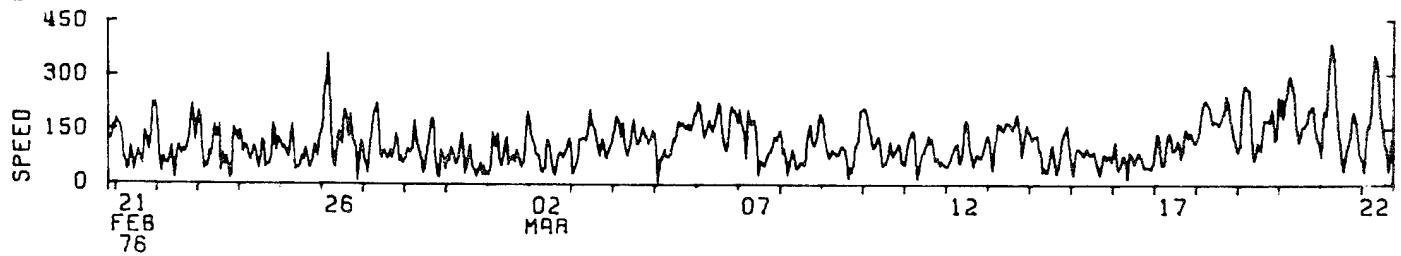
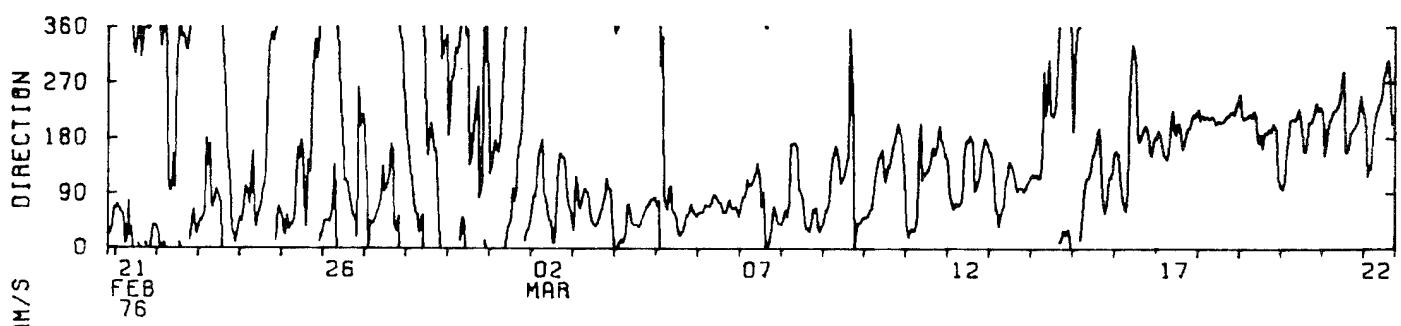
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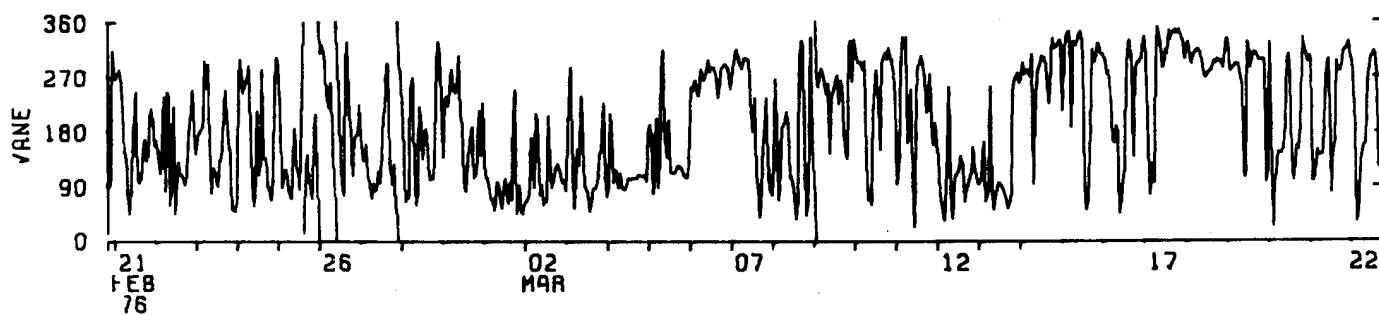
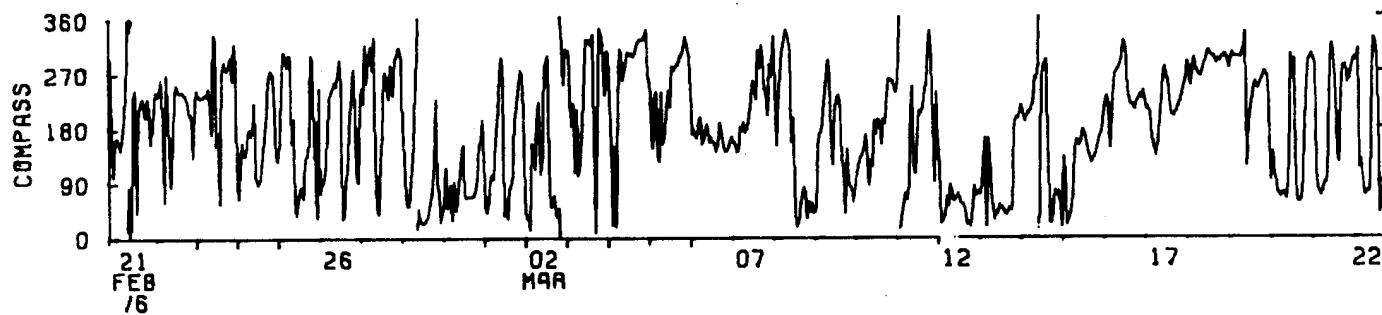
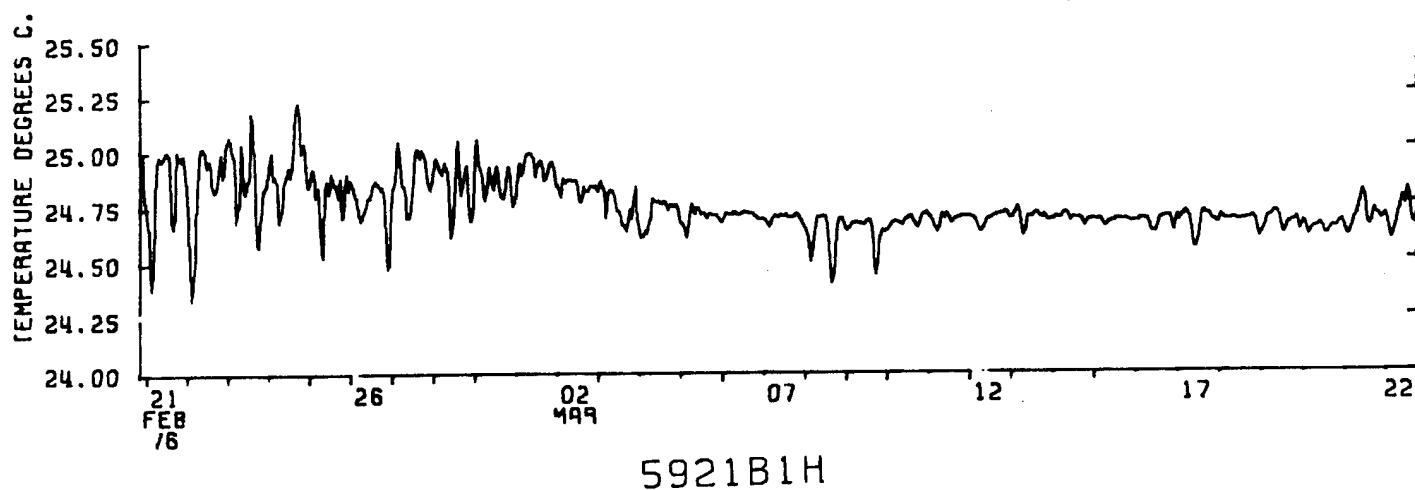


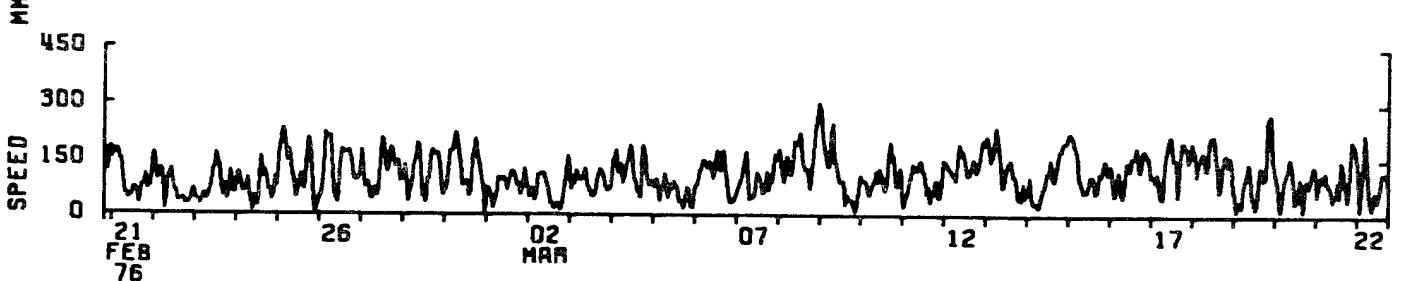
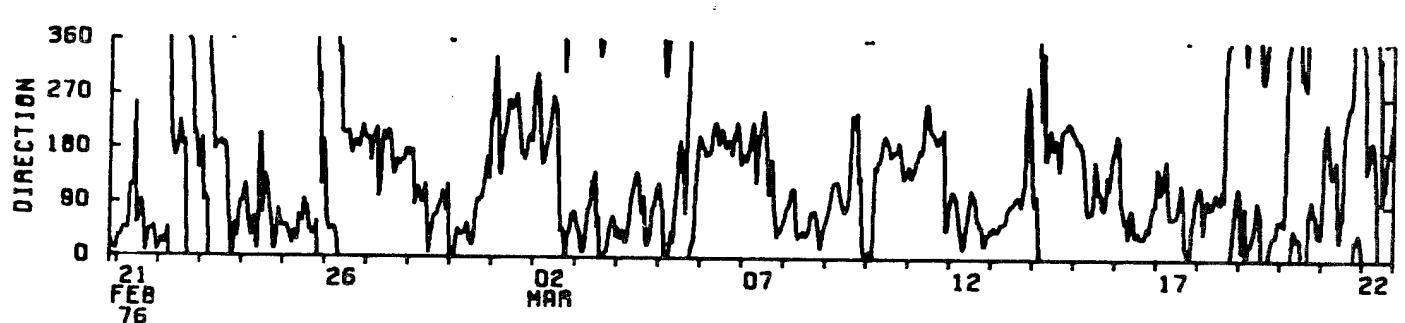
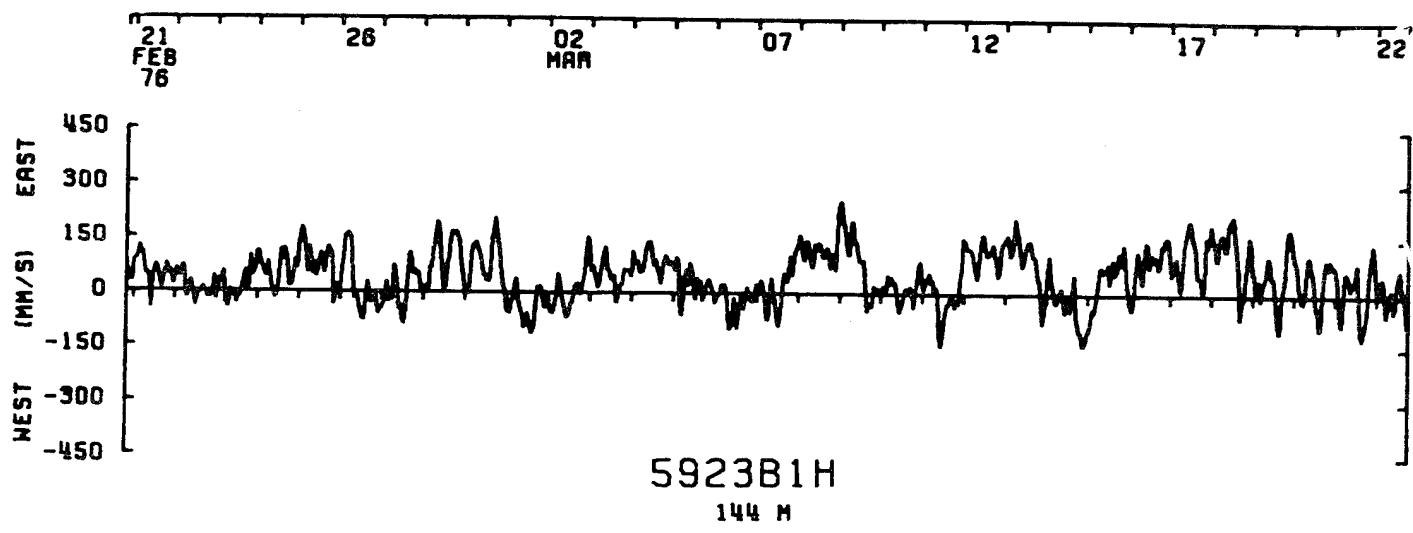
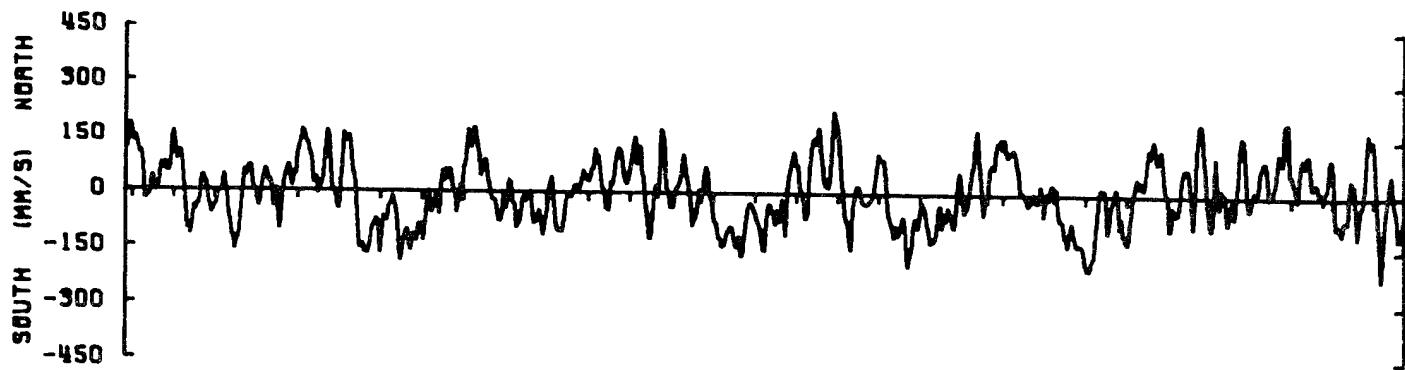
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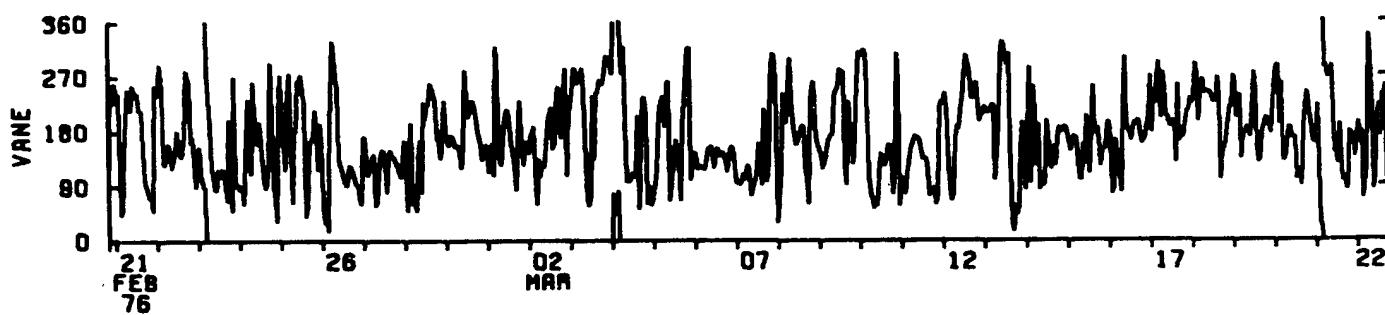
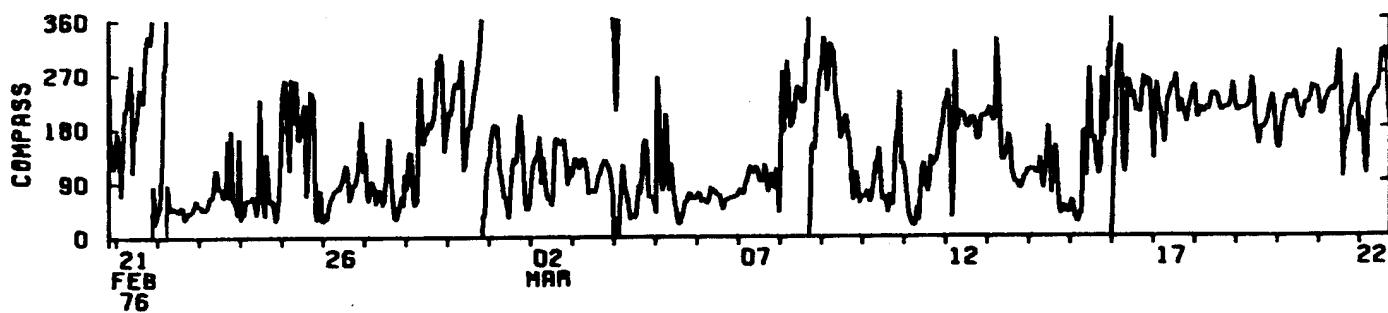
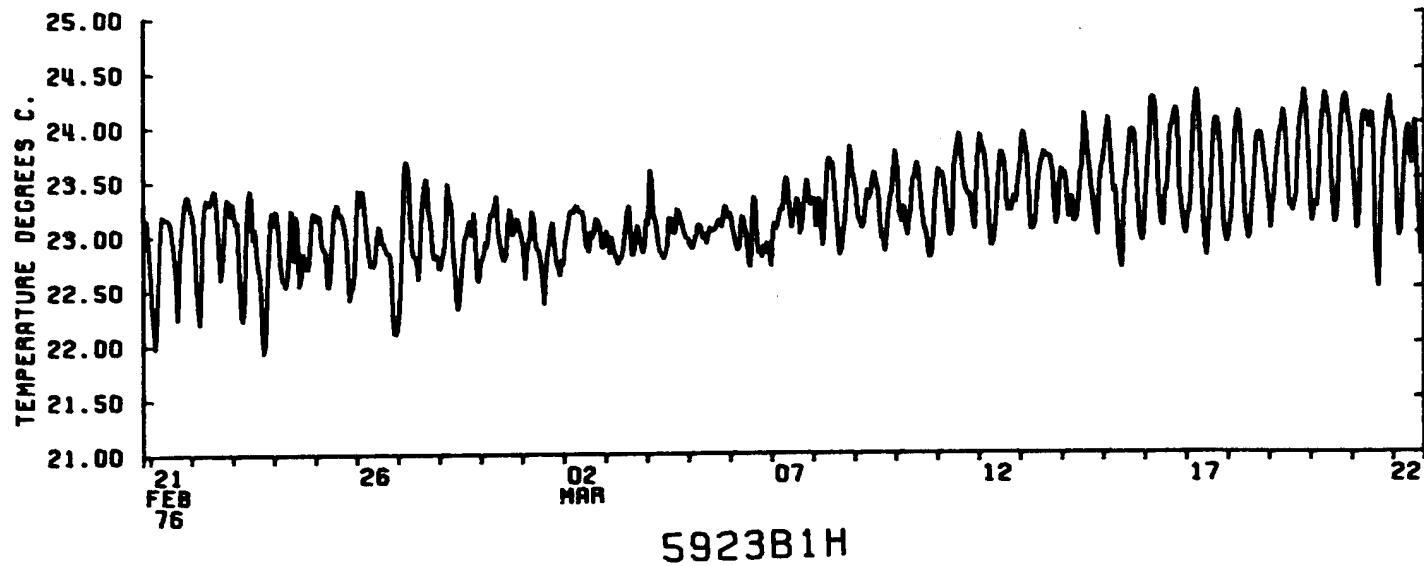
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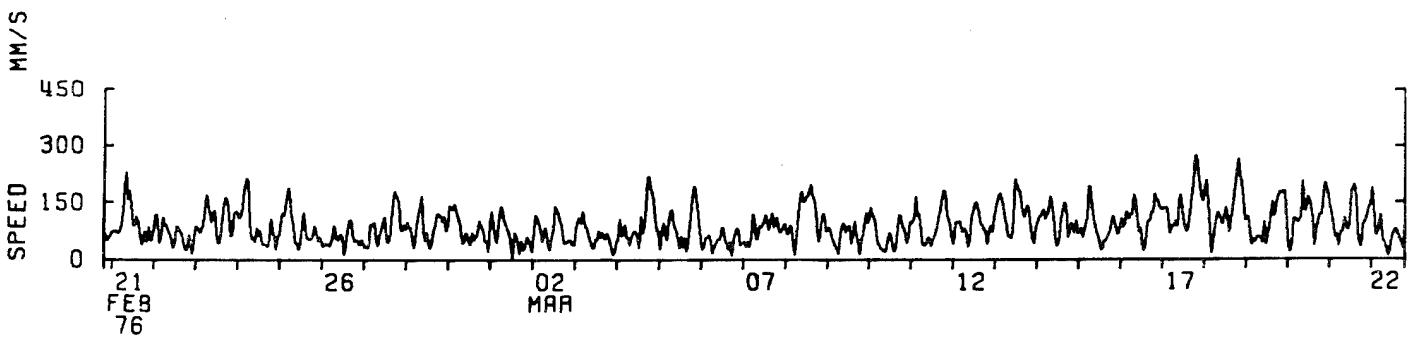
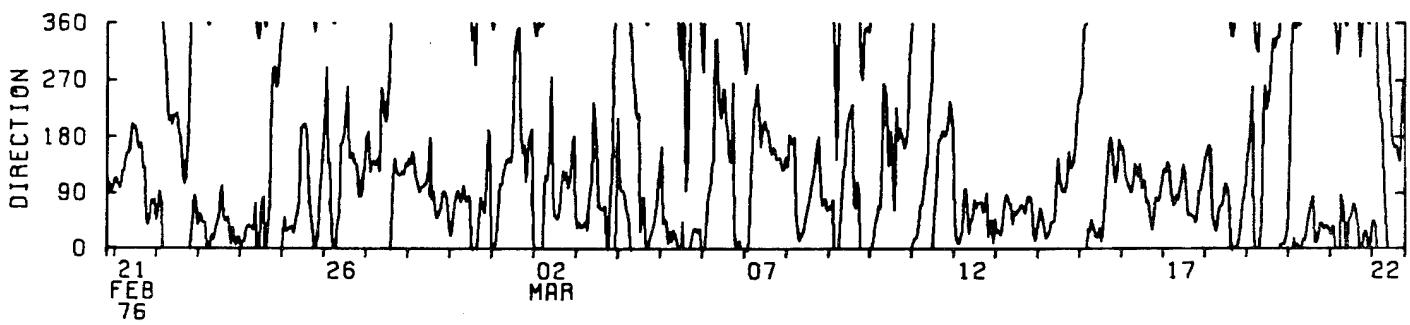
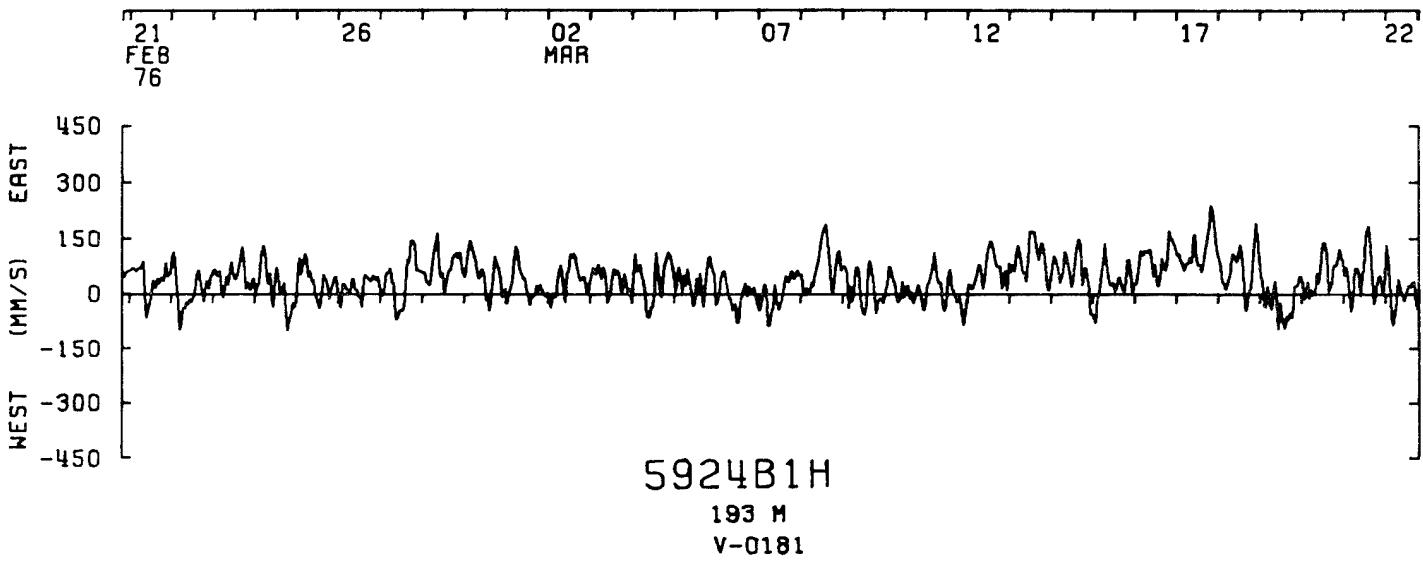
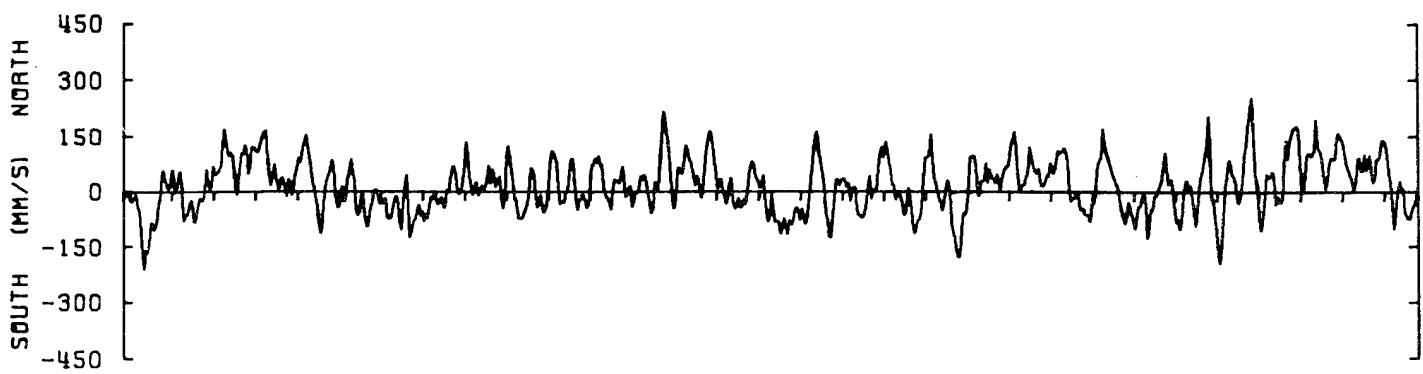
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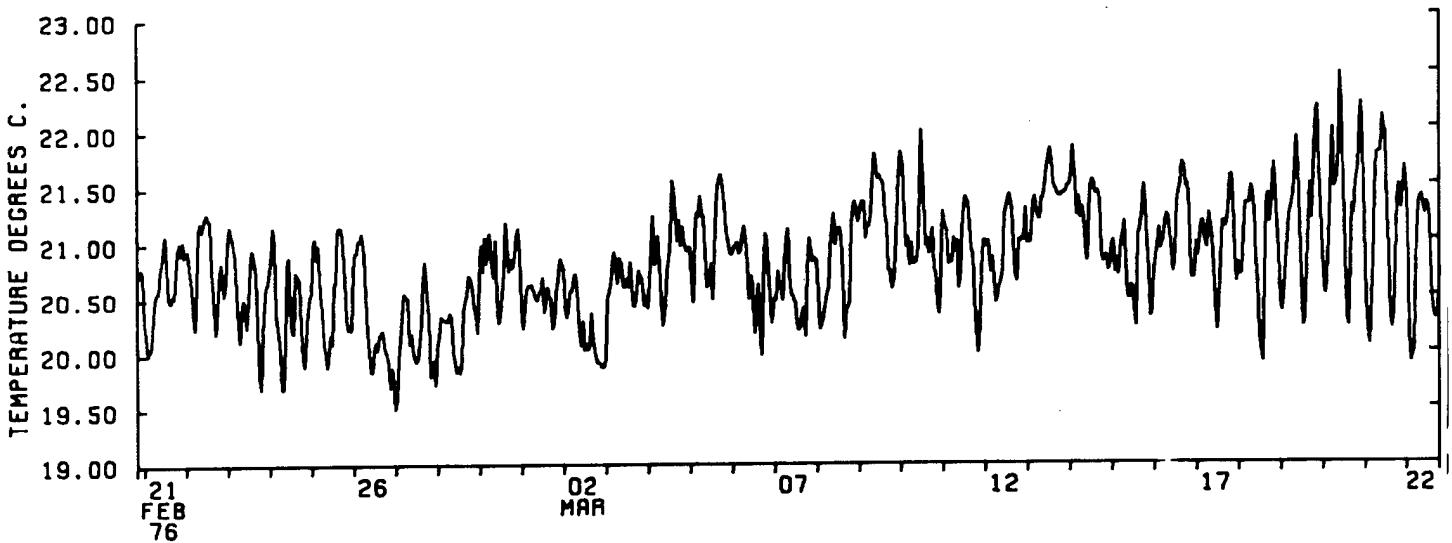




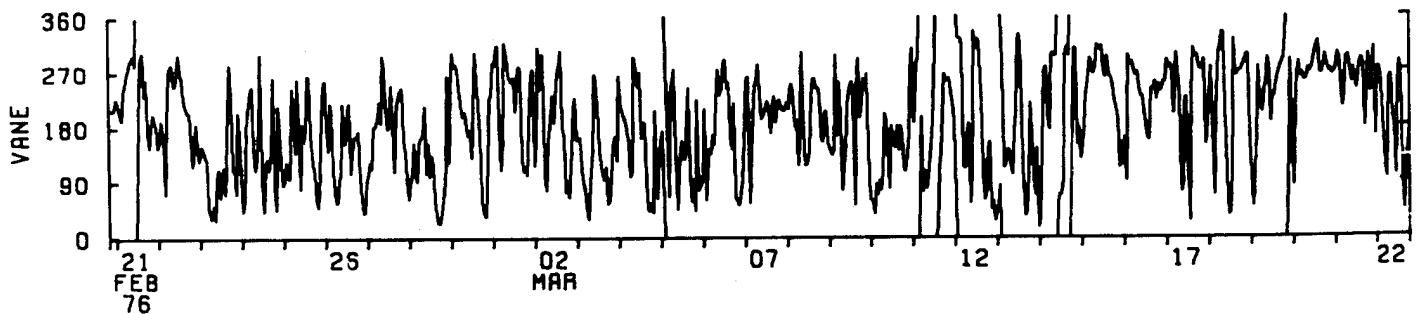
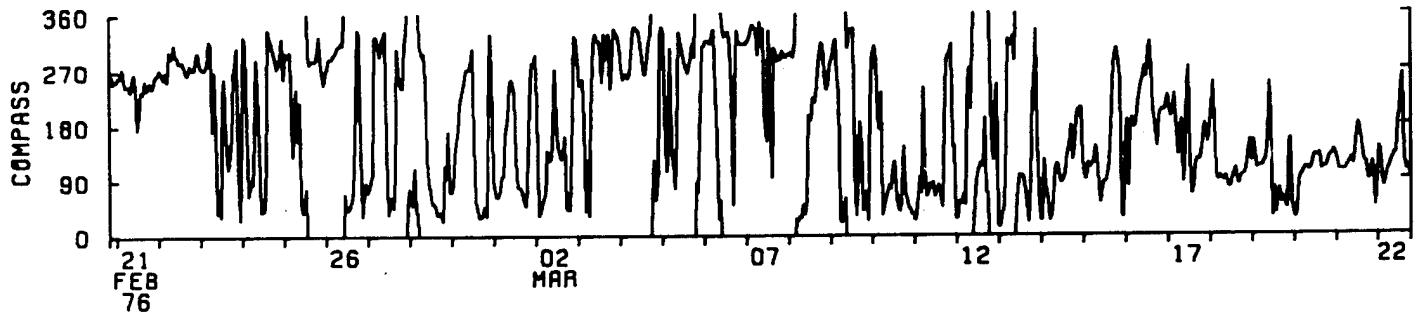


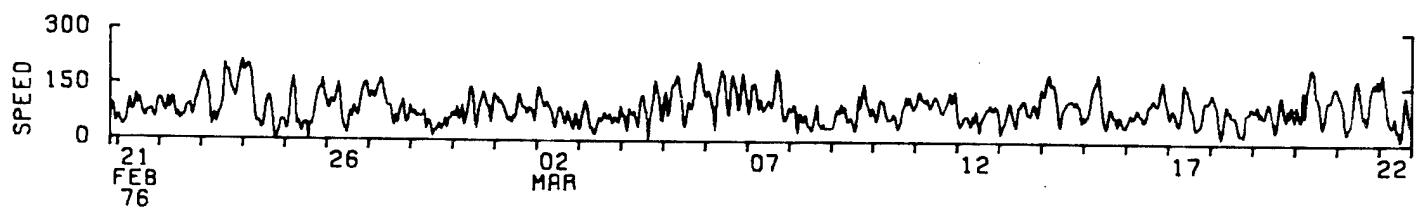
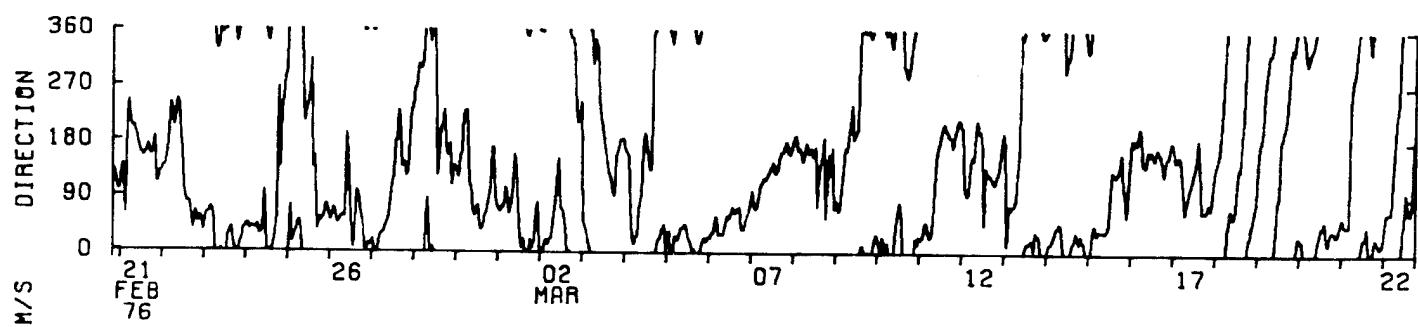
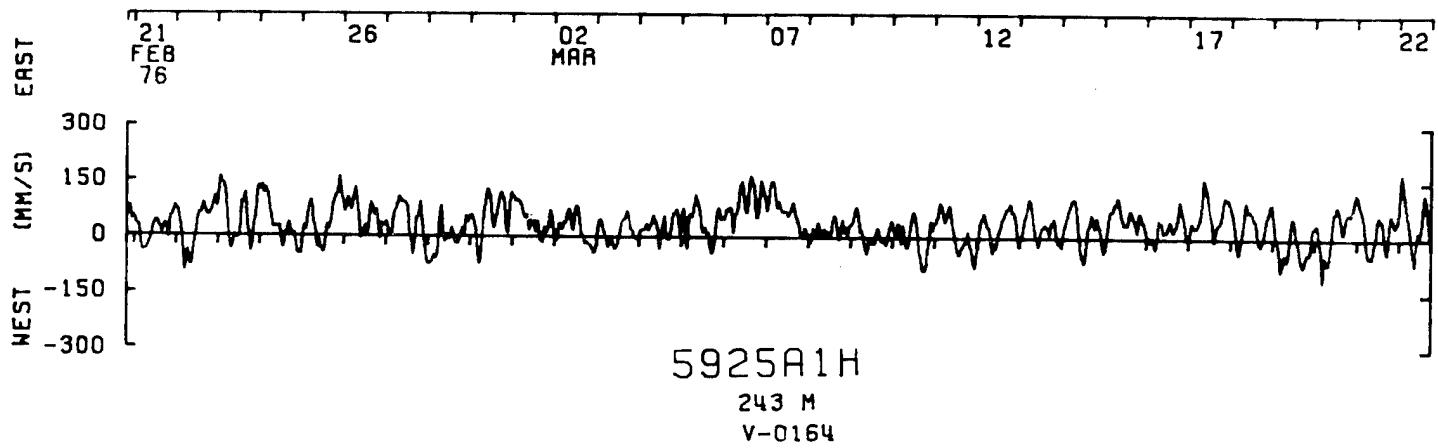
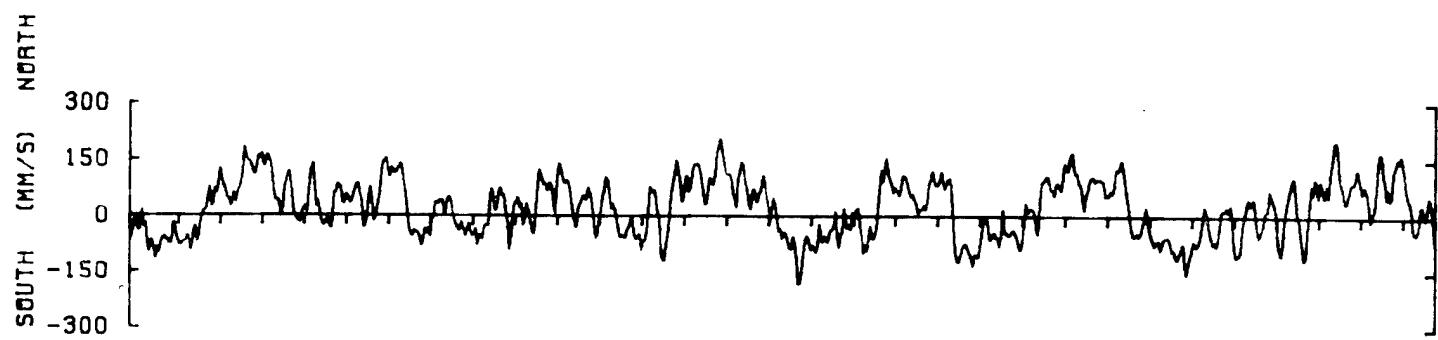


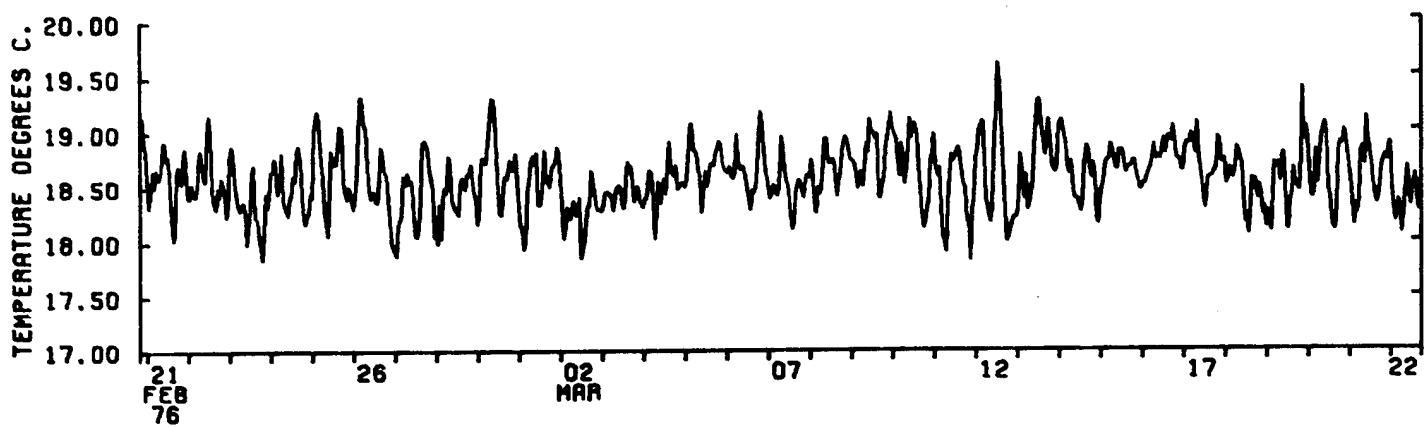




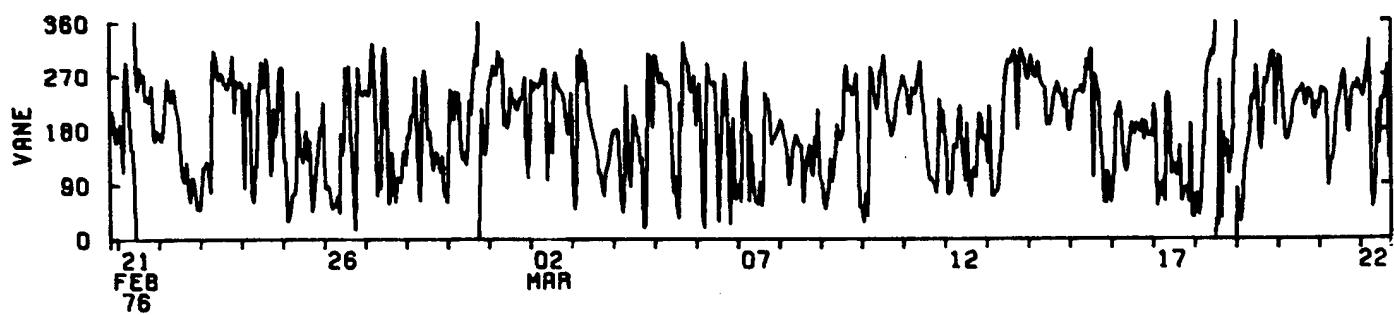
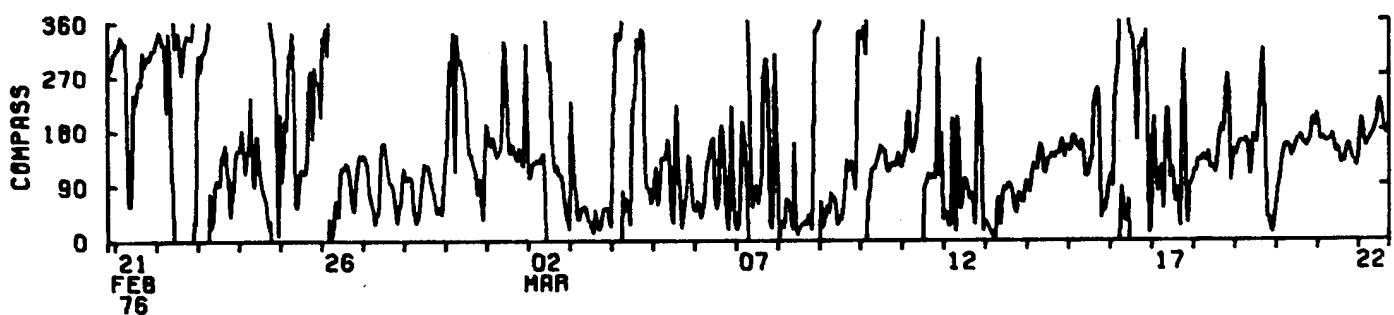
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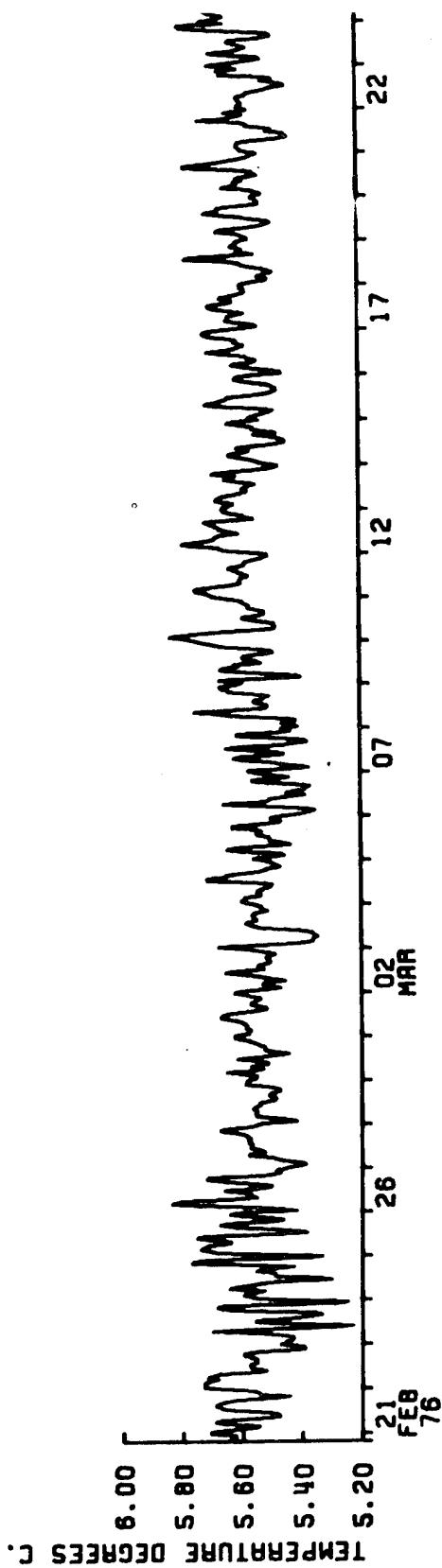






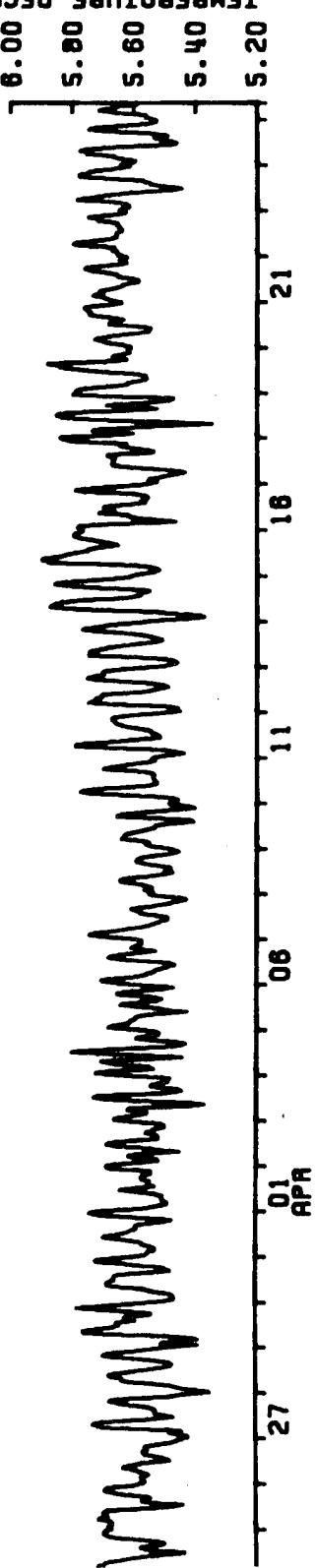
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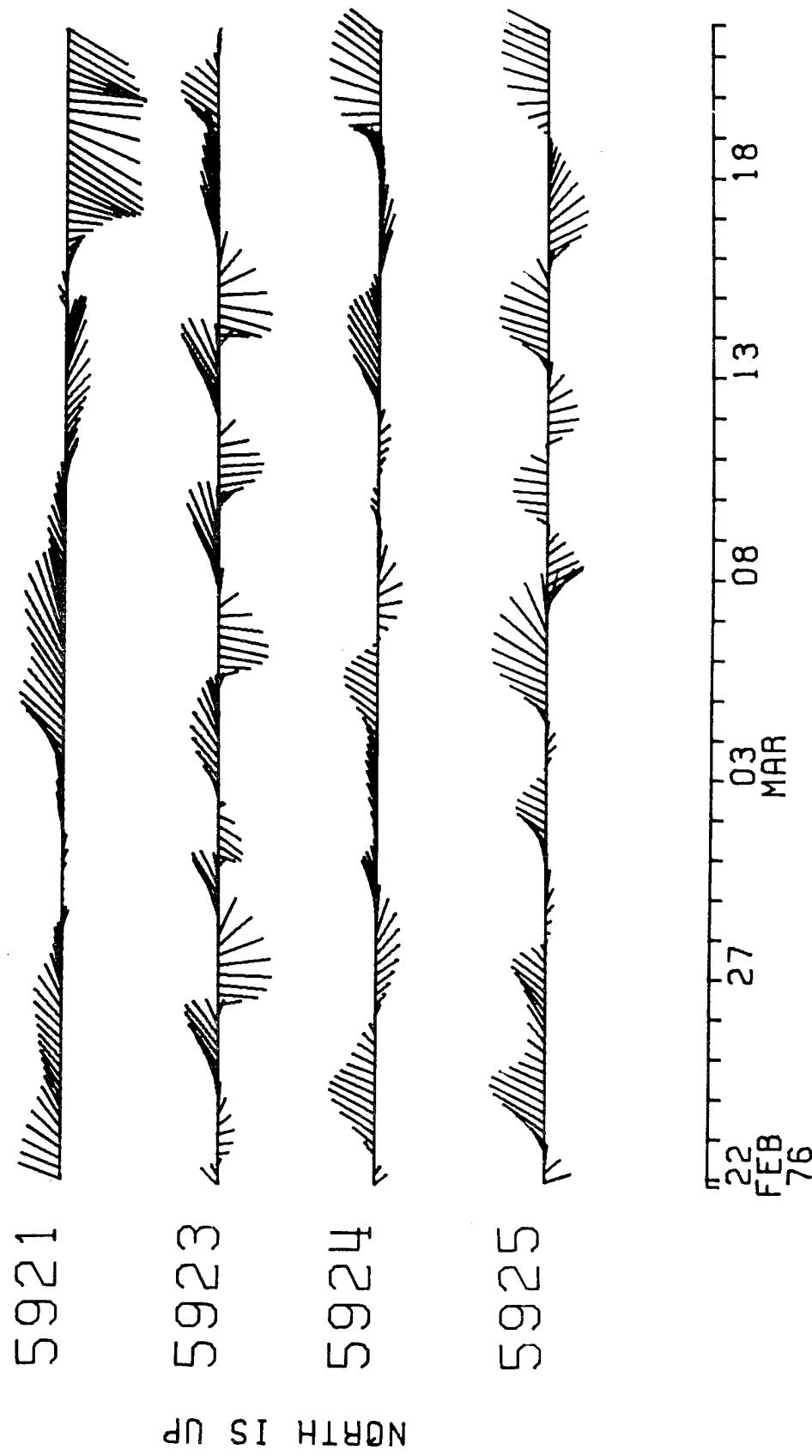
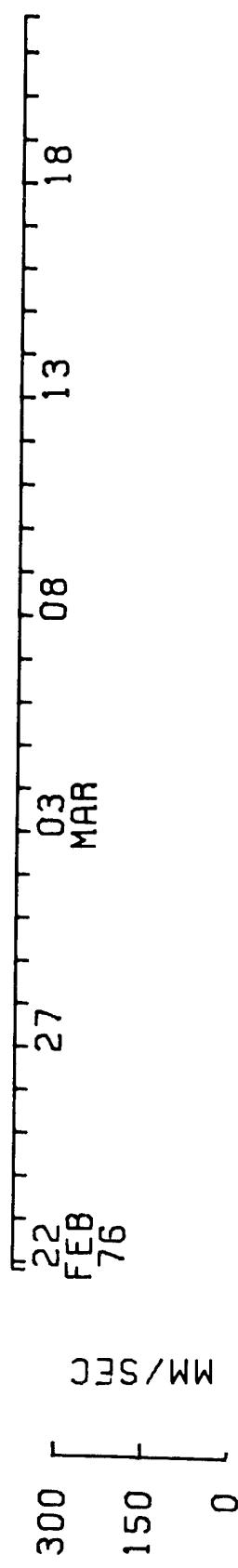


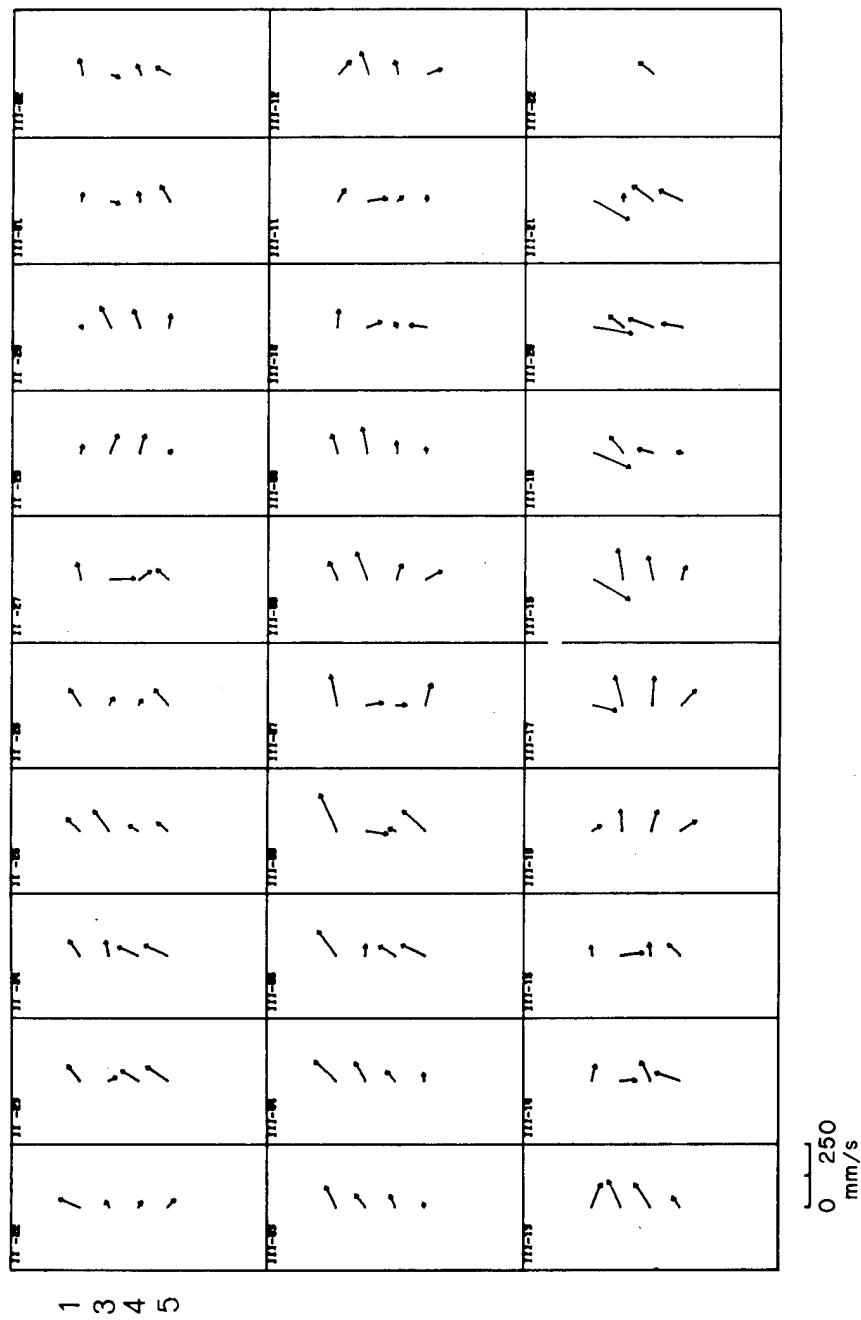


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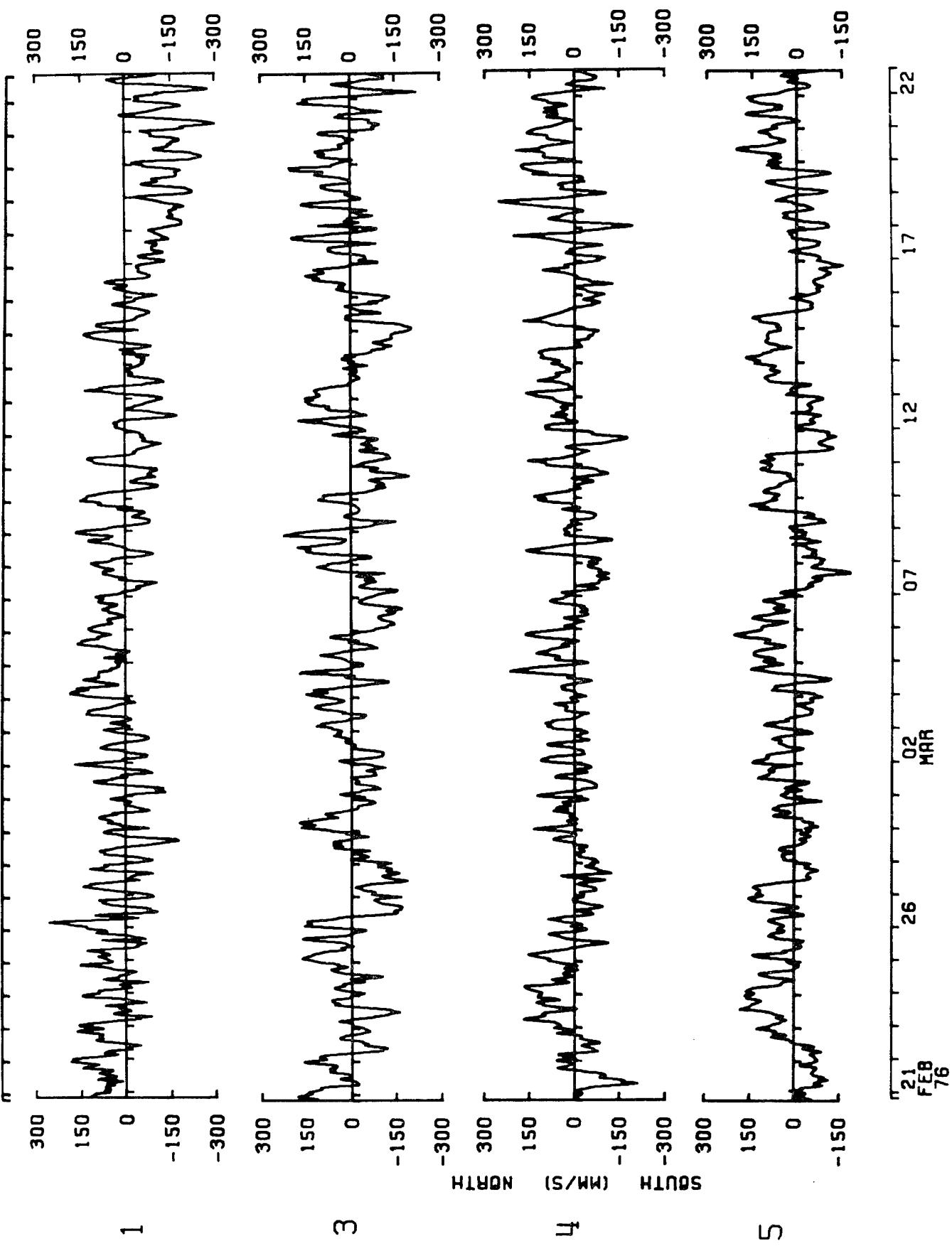
TEMPERATURE DEGREES C.

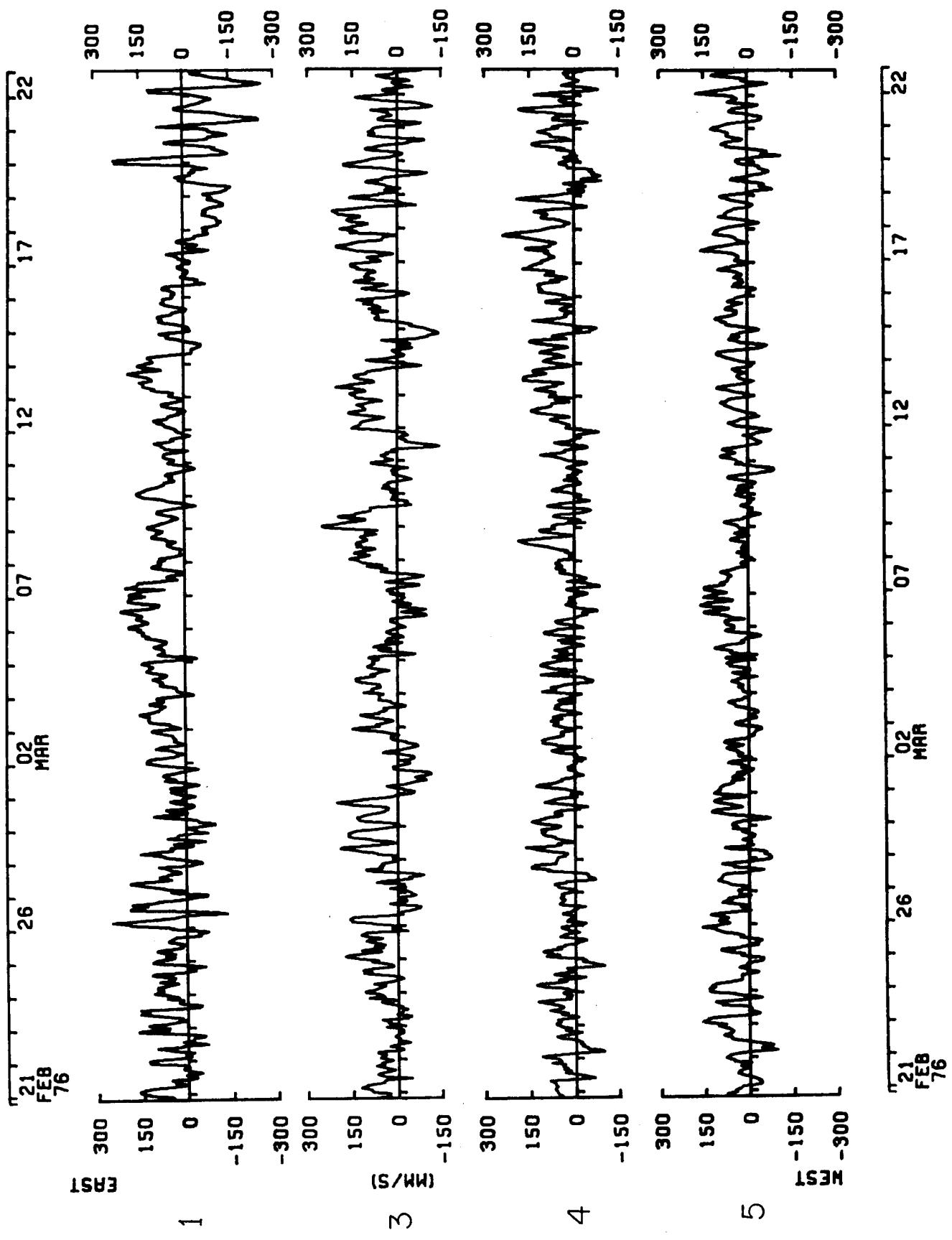


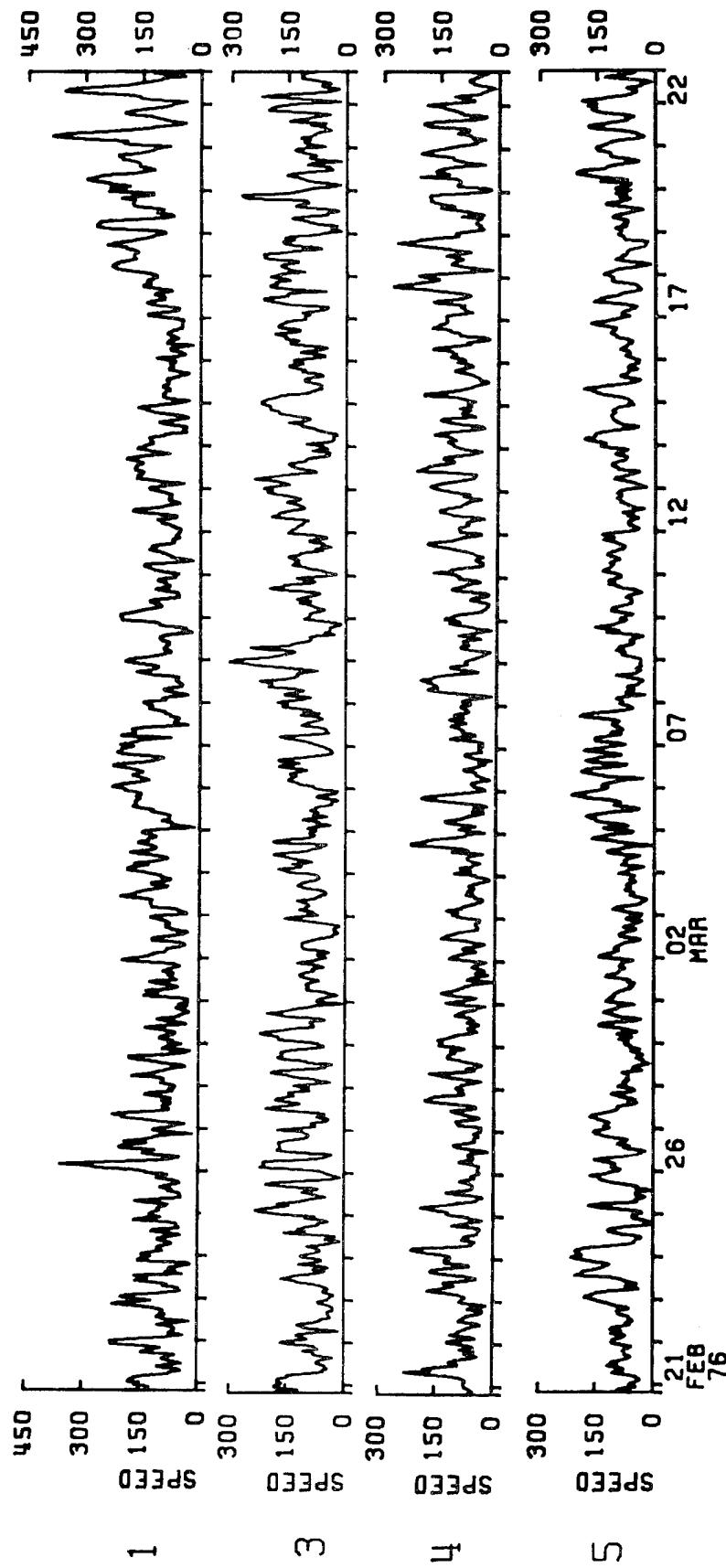


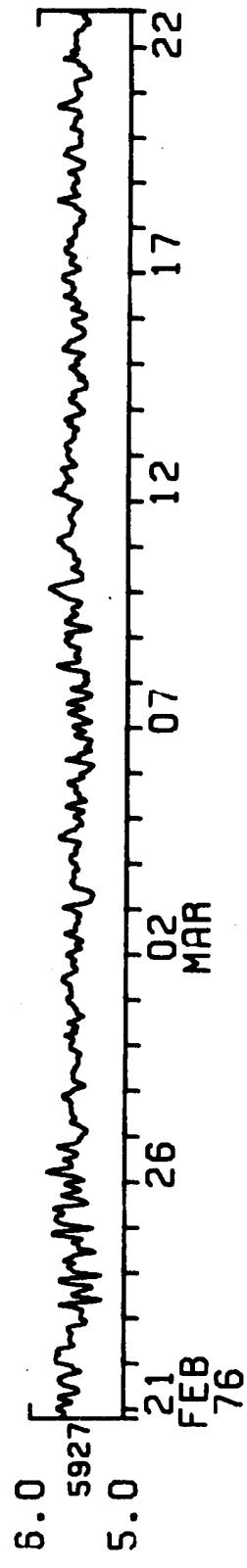
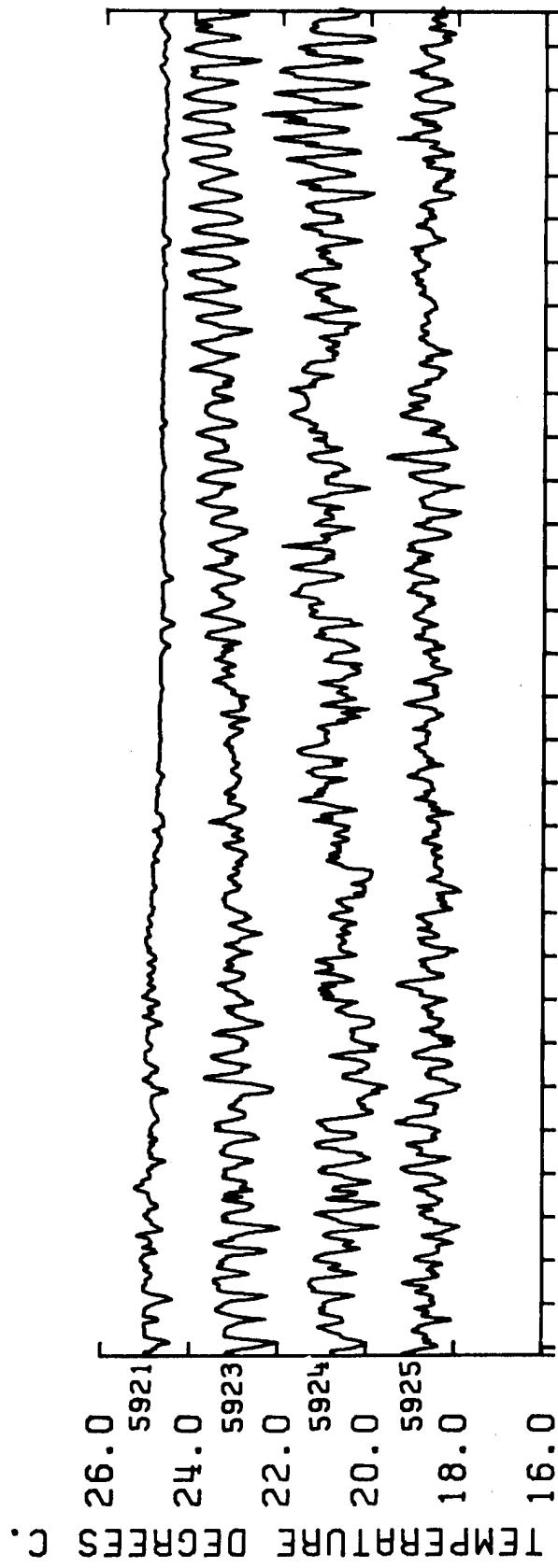


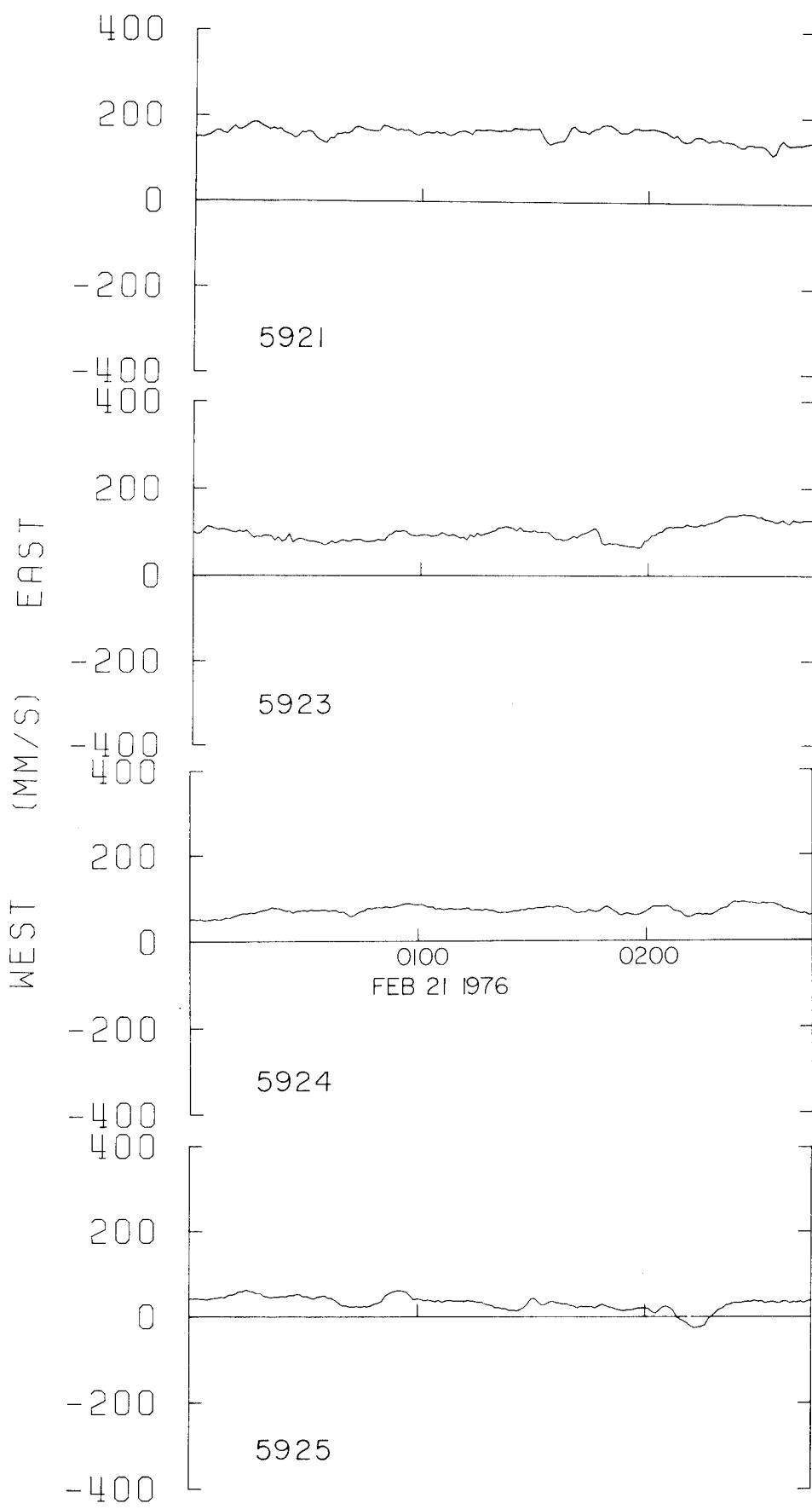
Daily averages from four current meters plotted by depth
 1) 5921 3) 5923 4) 5924 5) 5925

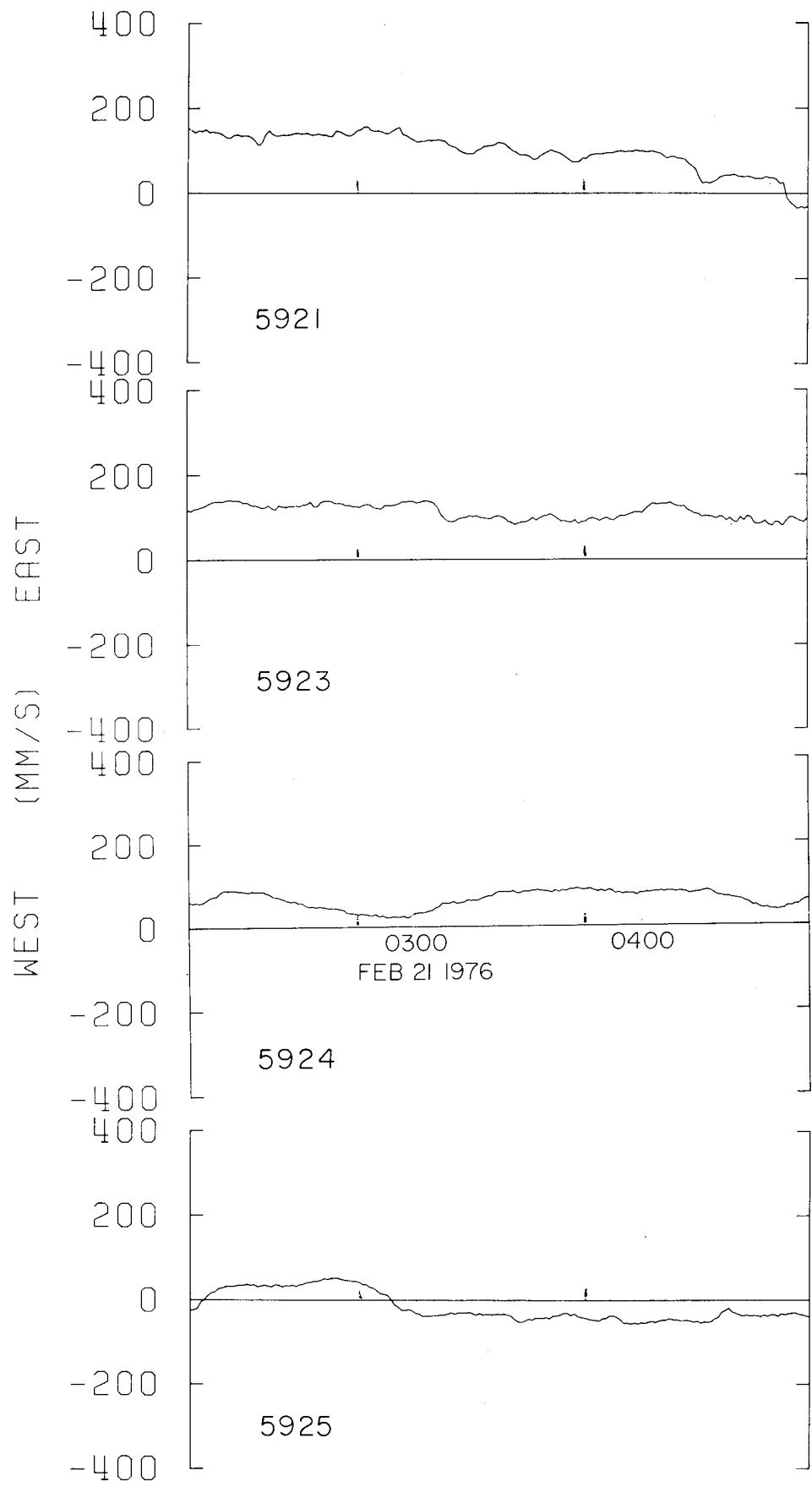


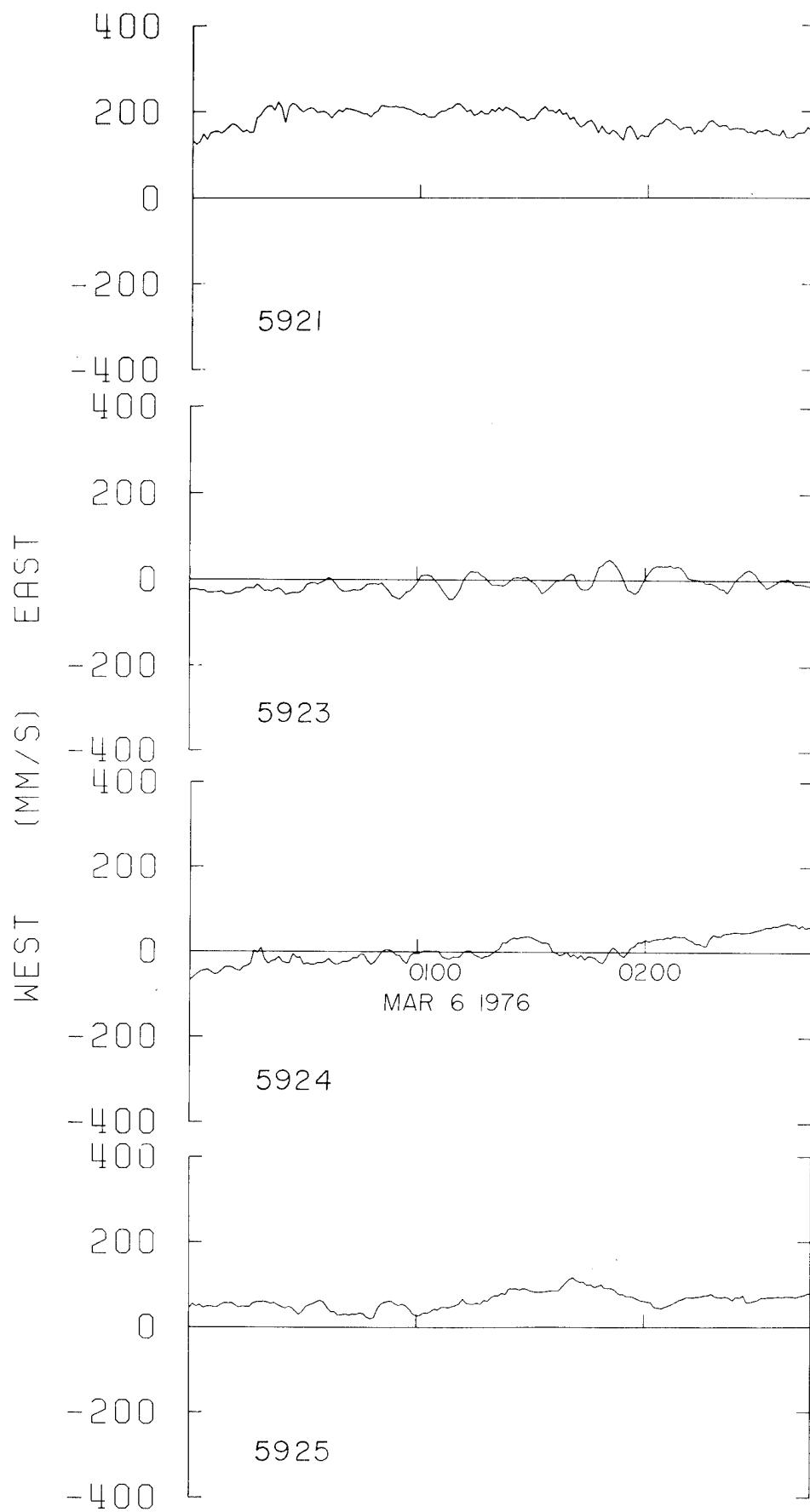


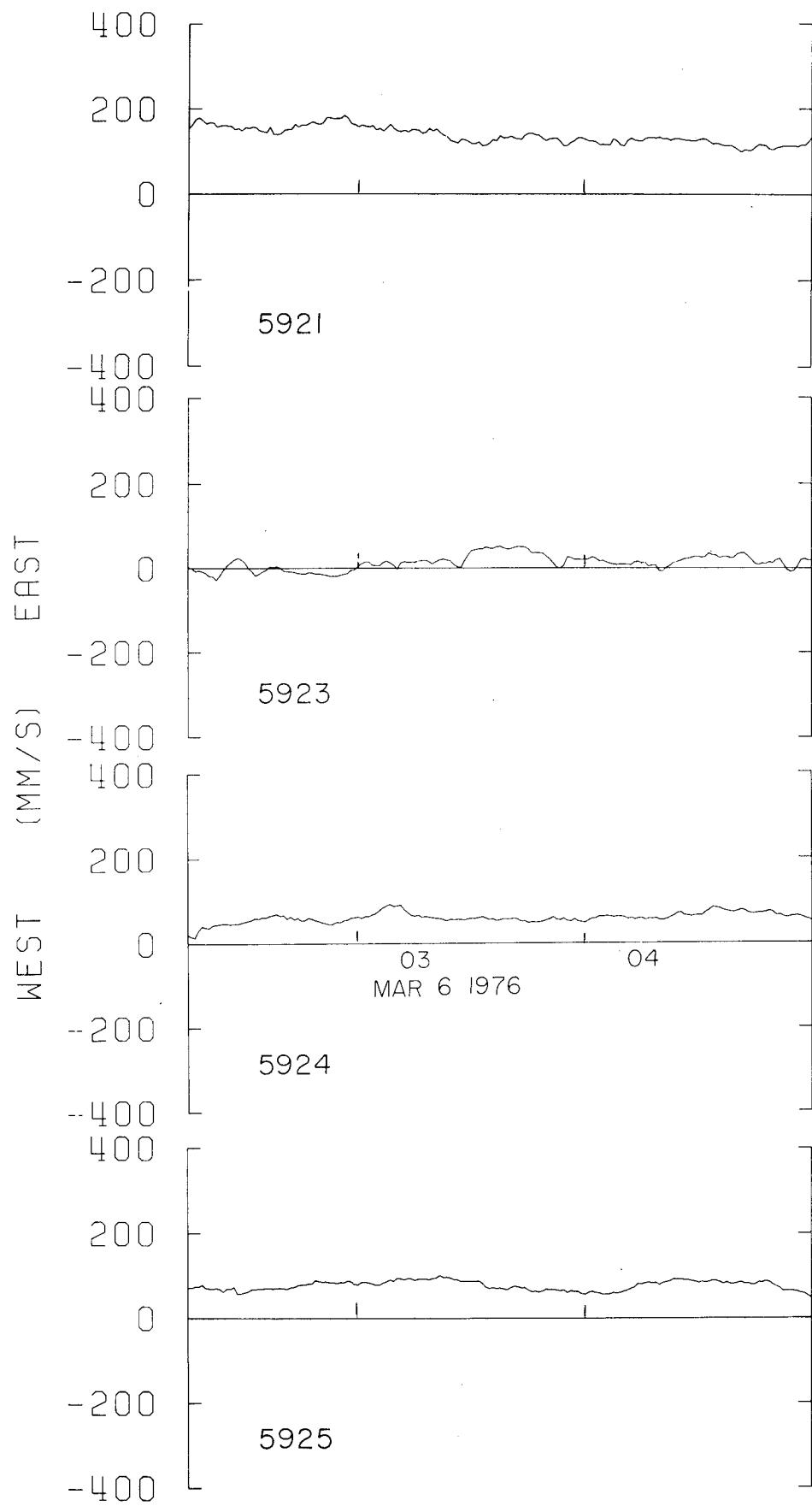


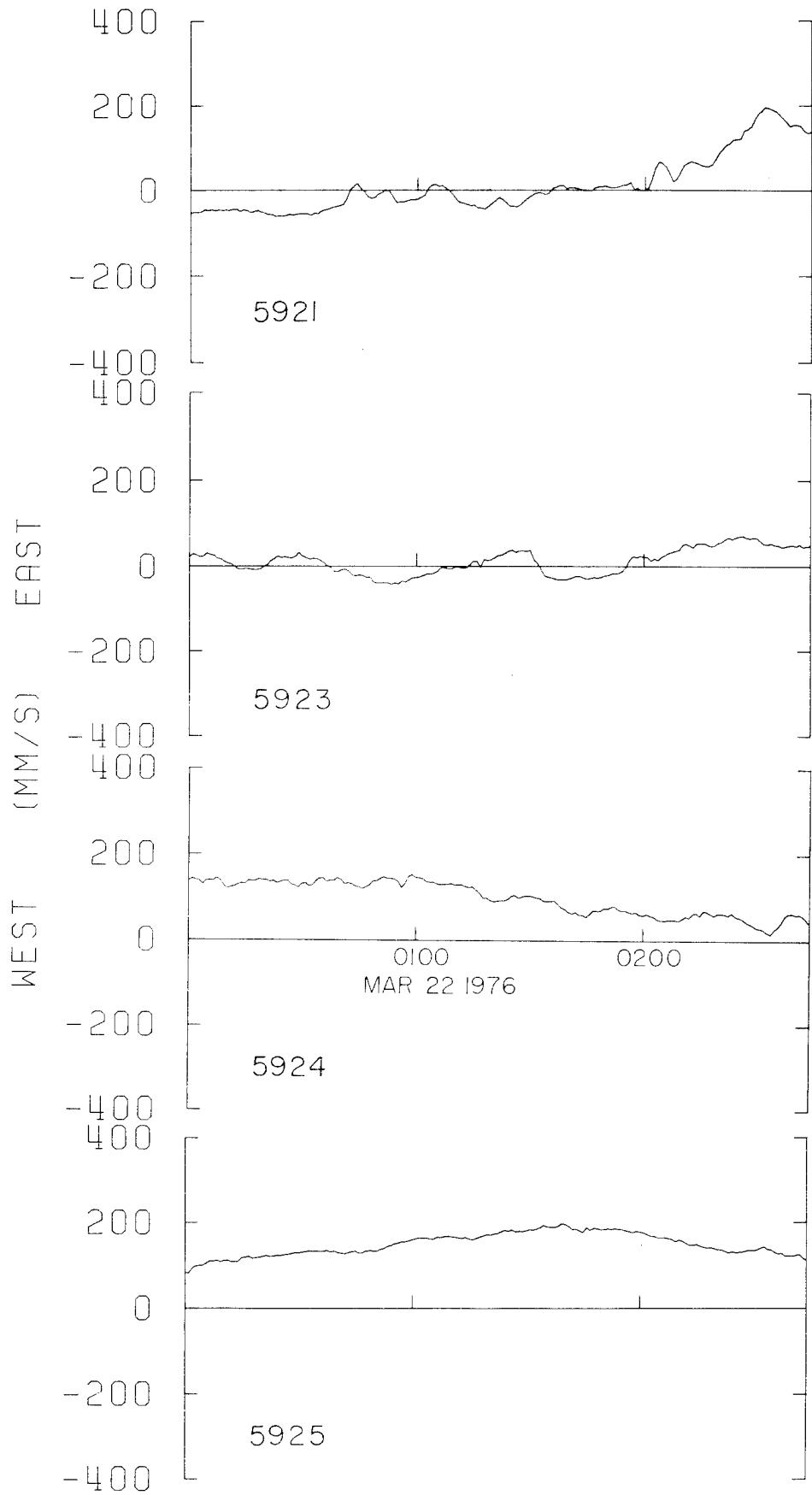


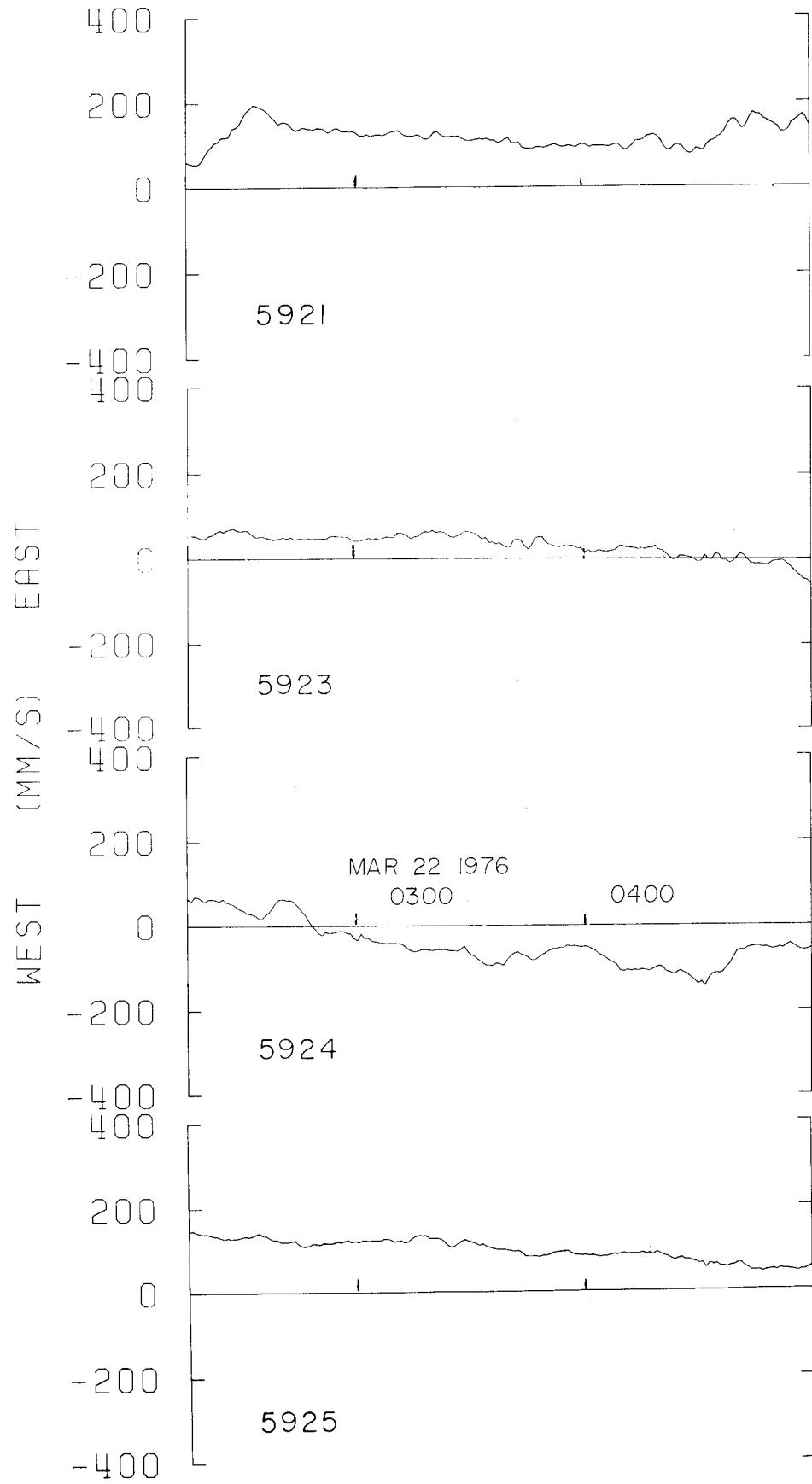


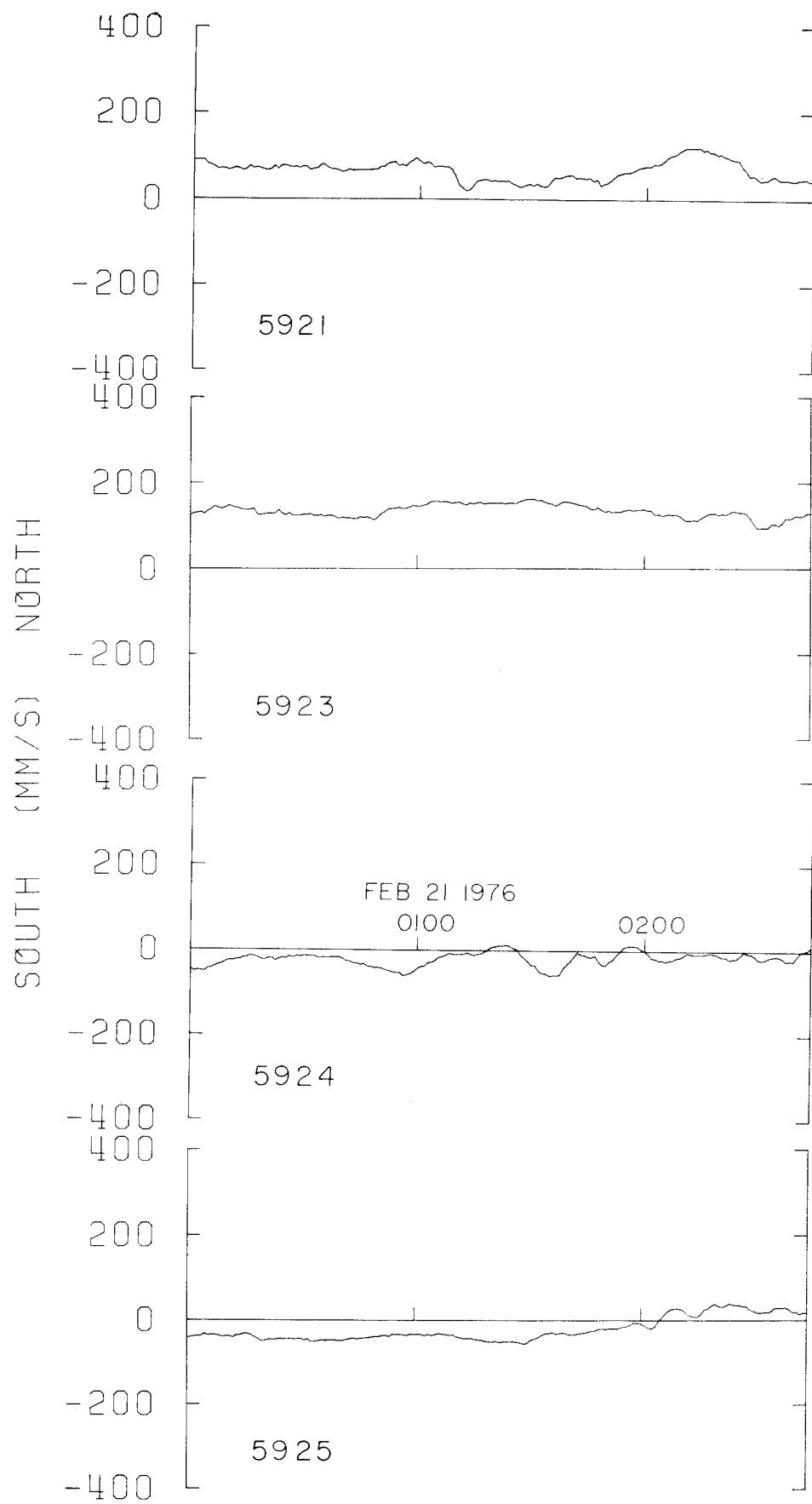


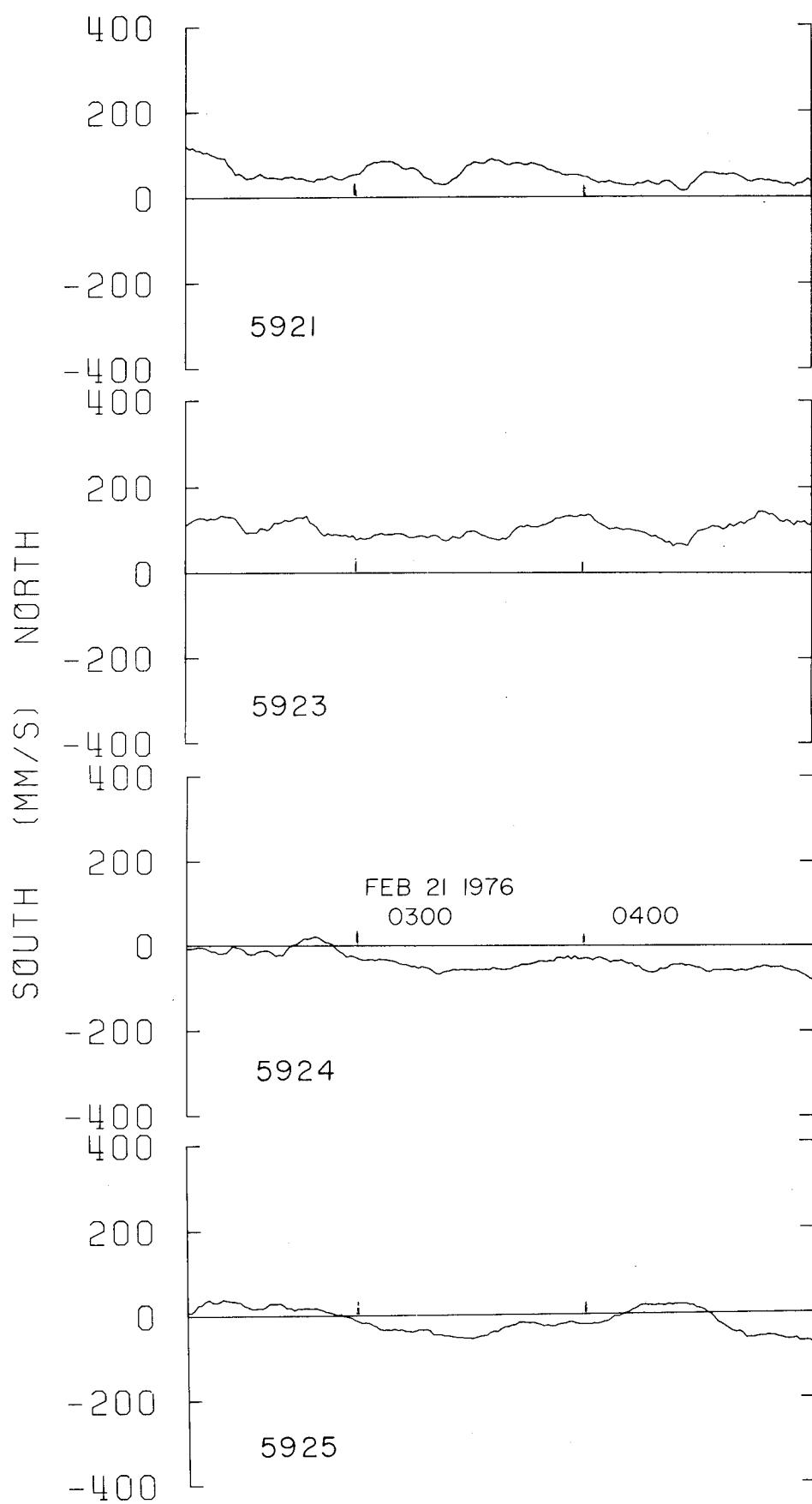


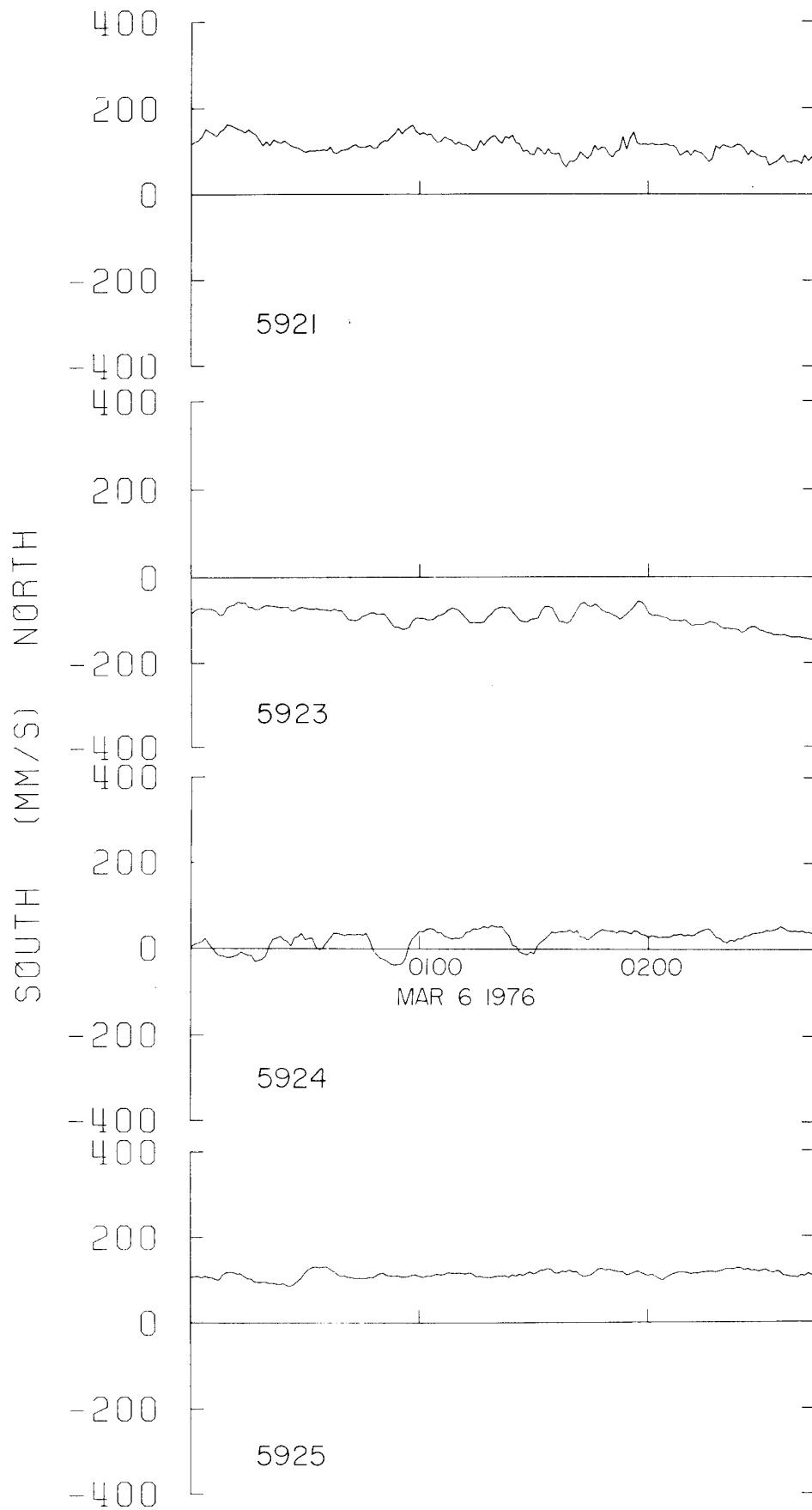


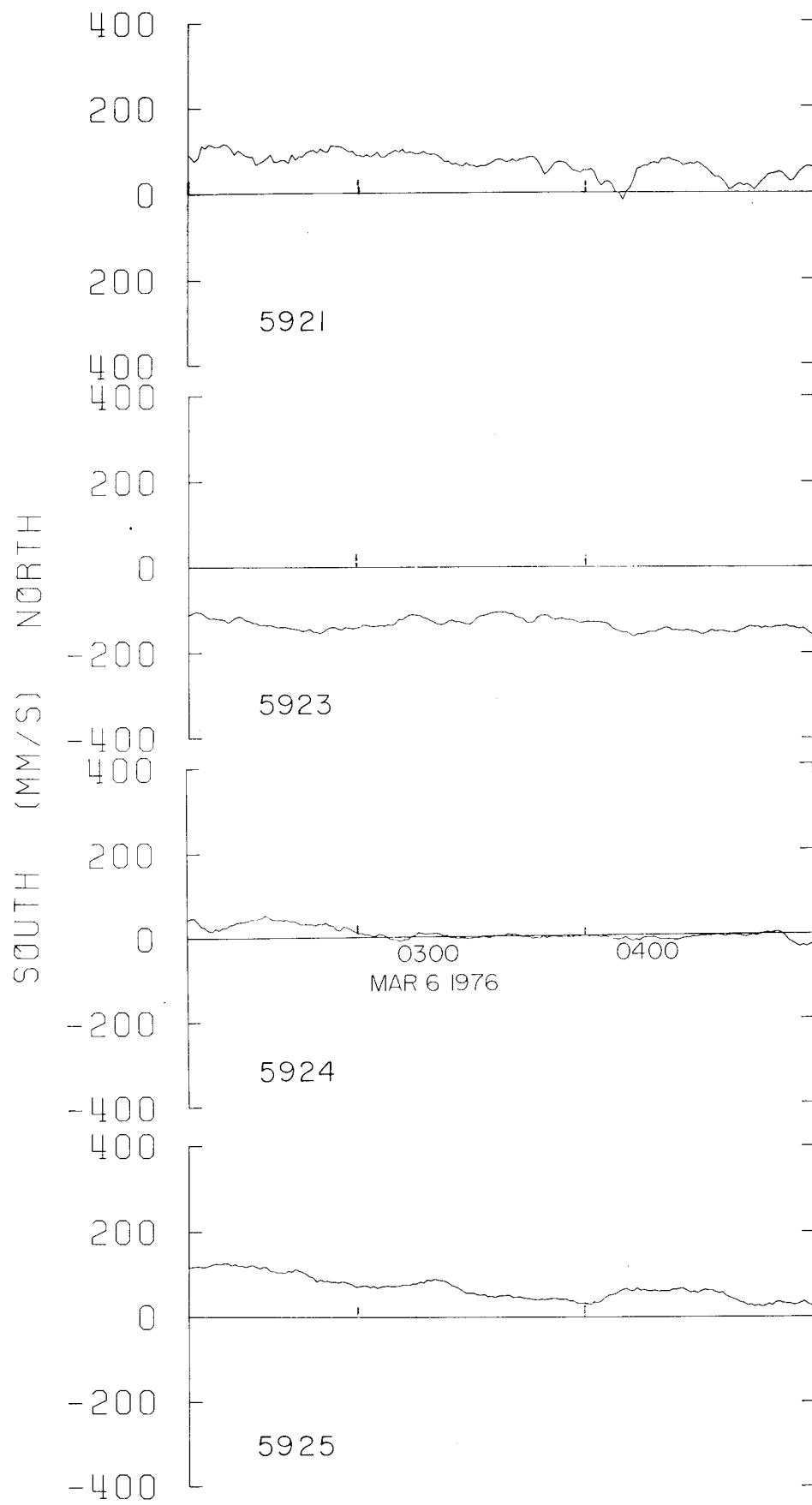


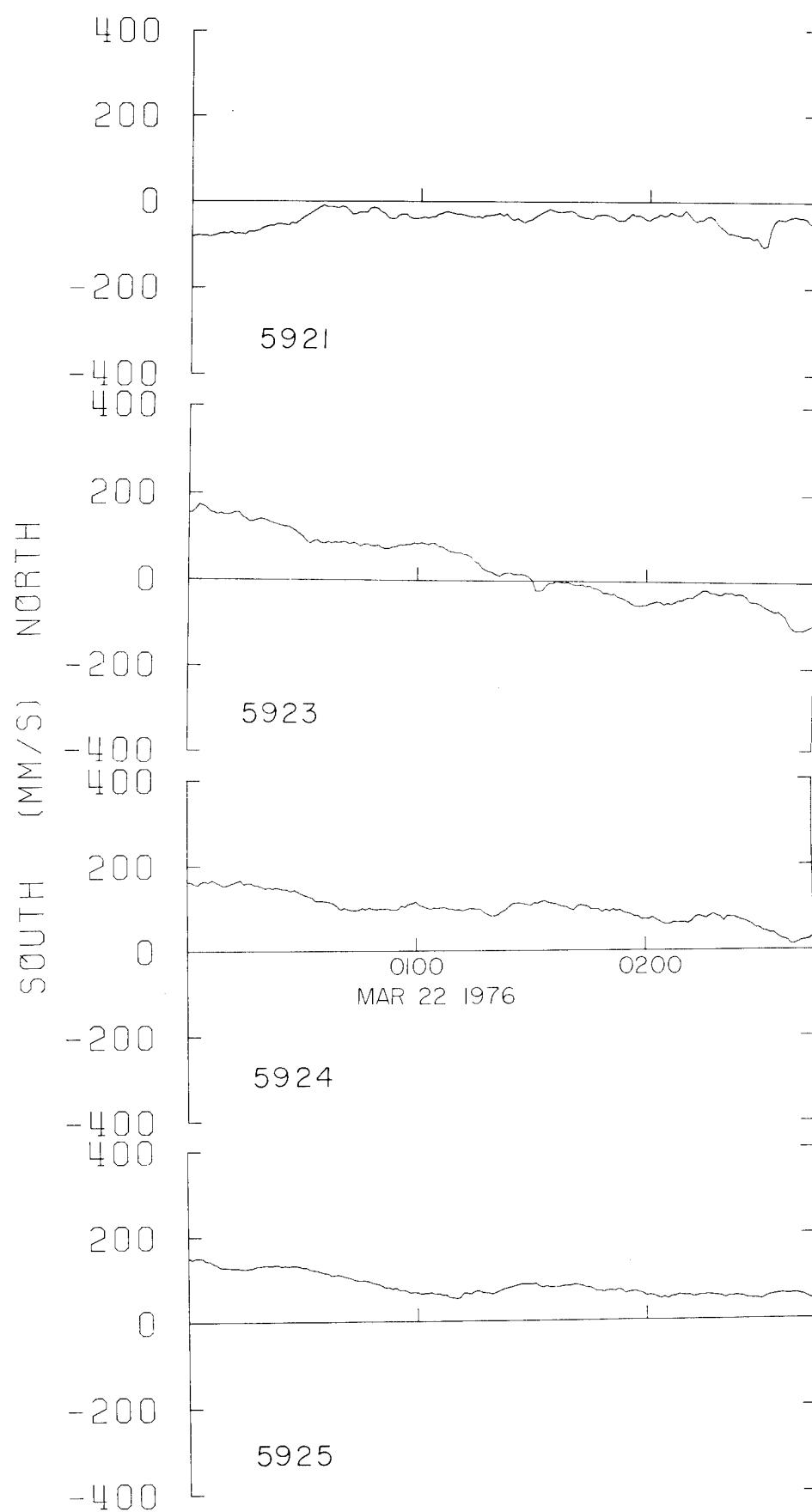


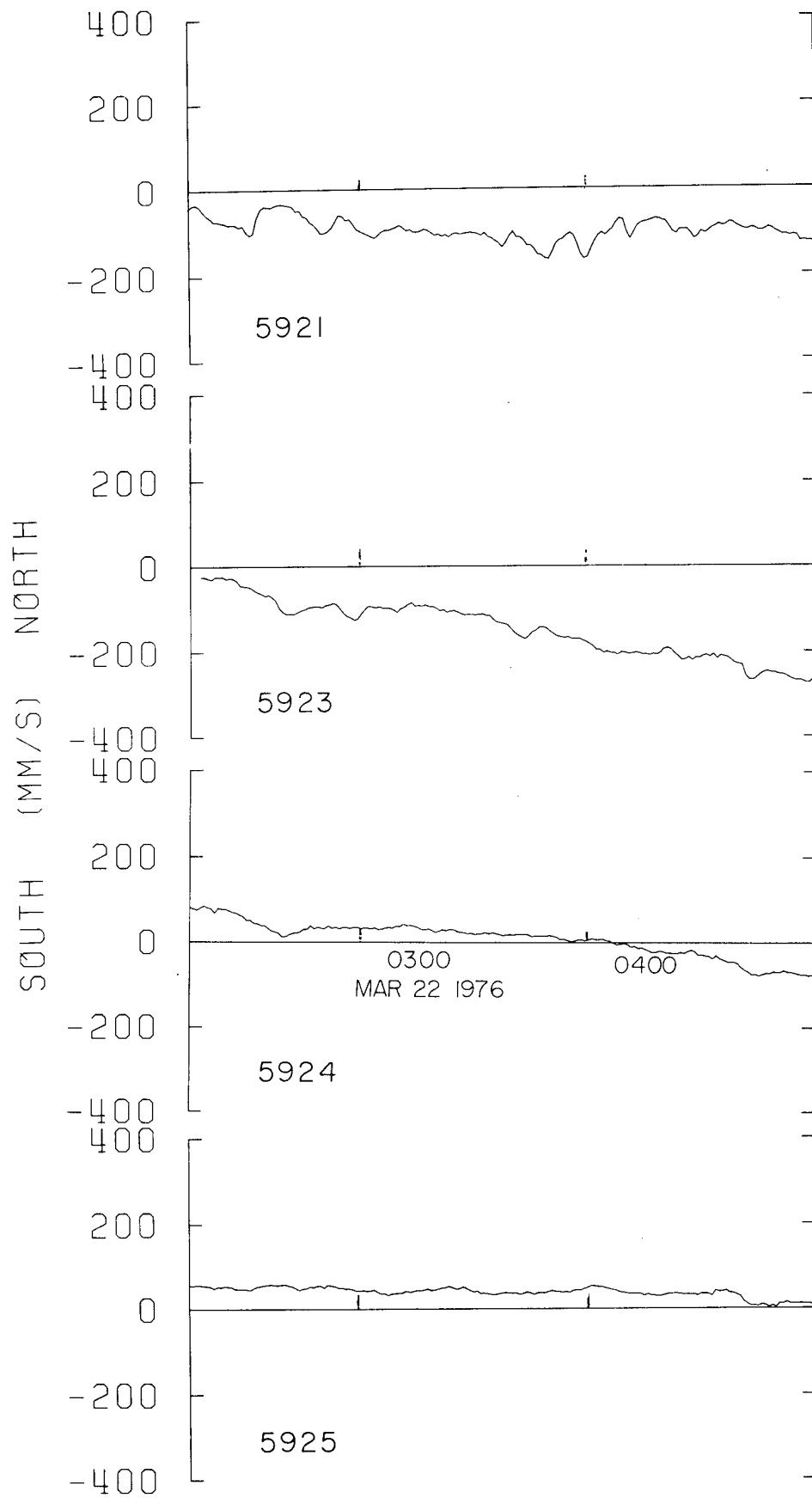






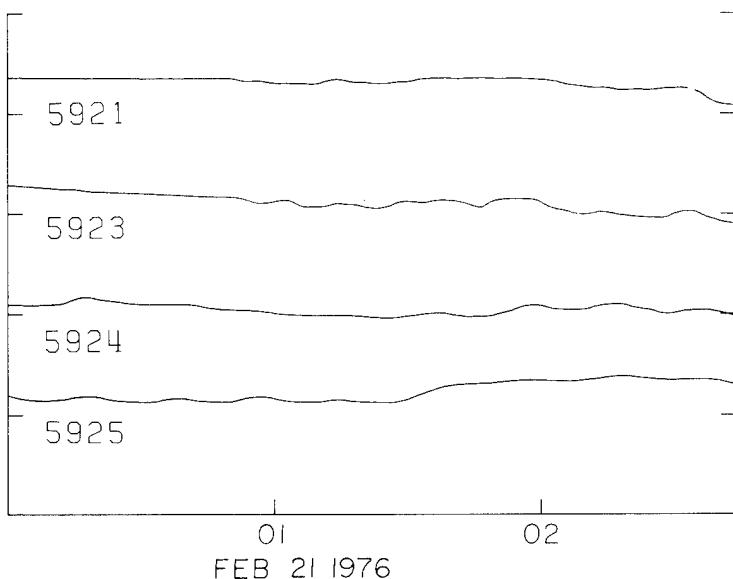




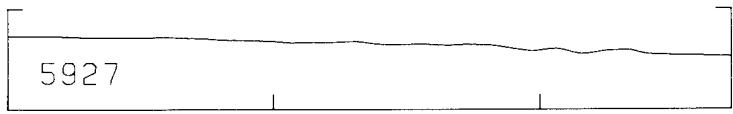


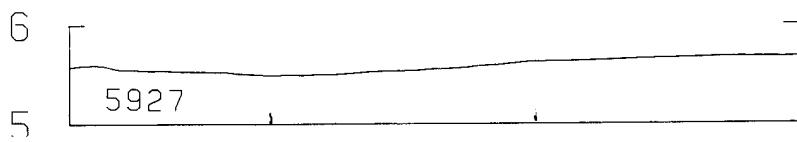
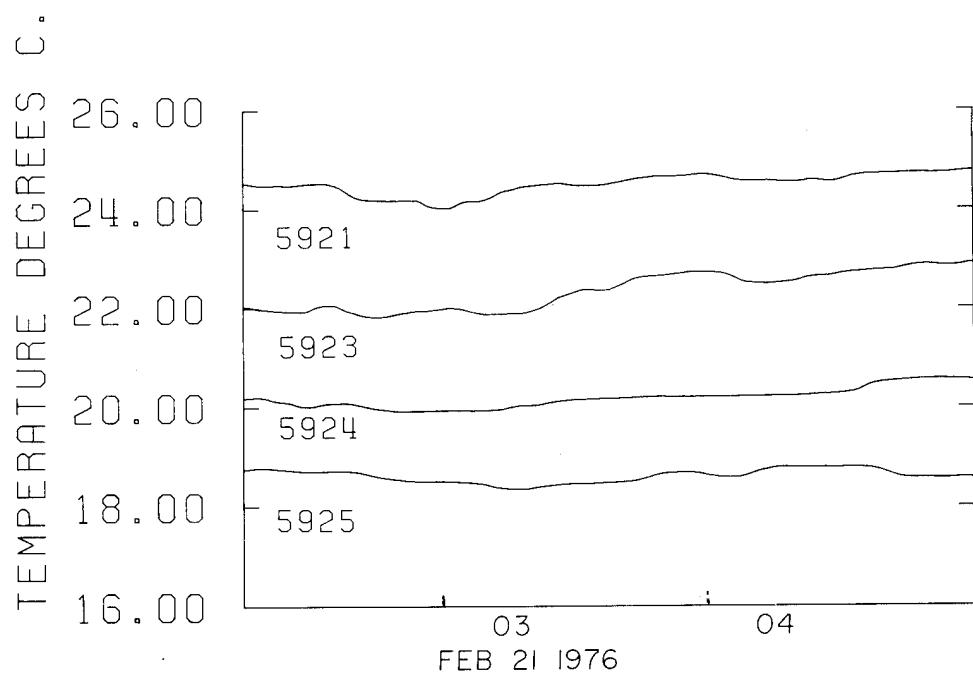
TEMPERATURE DEGREES C.

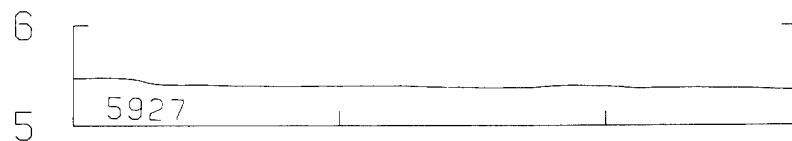
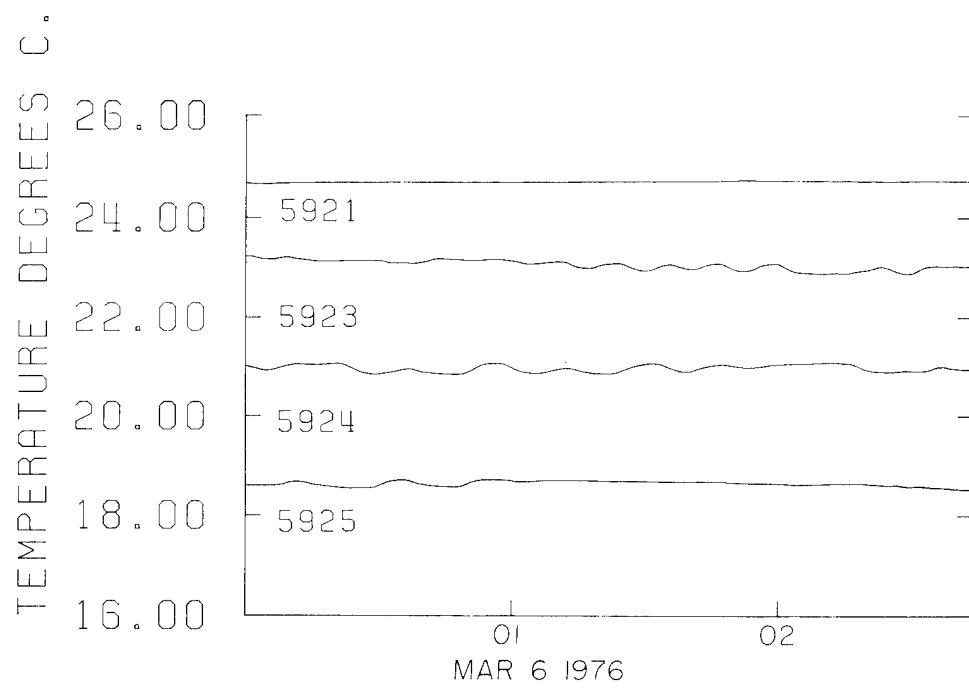
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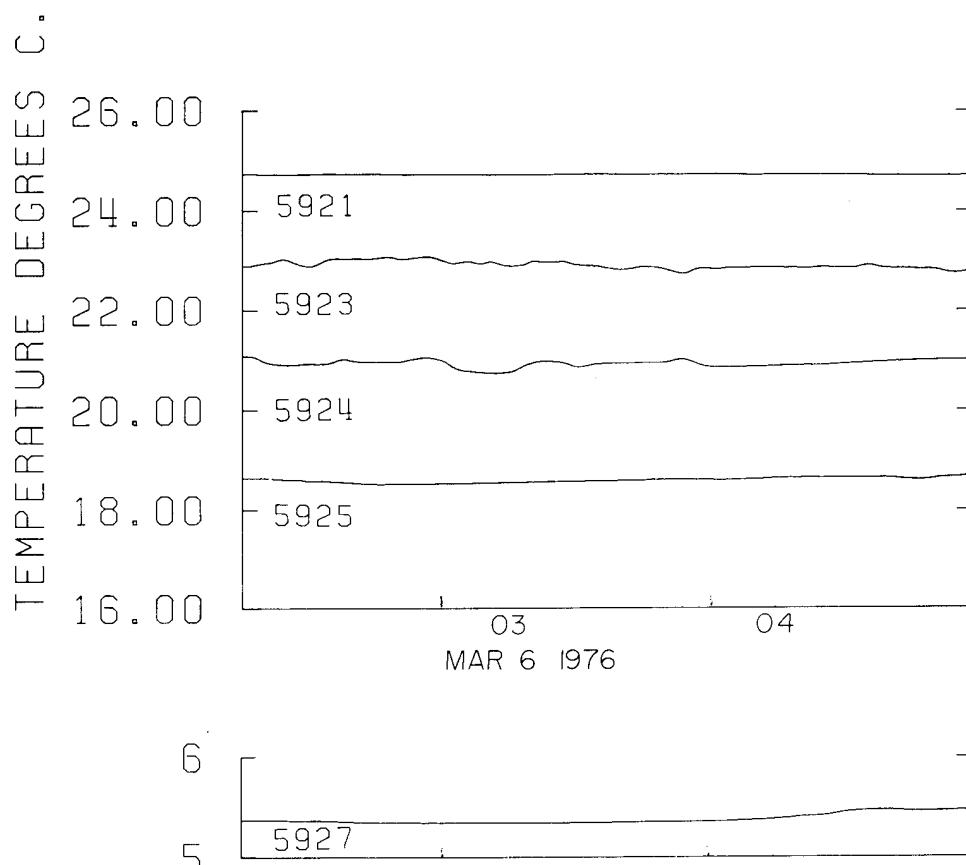


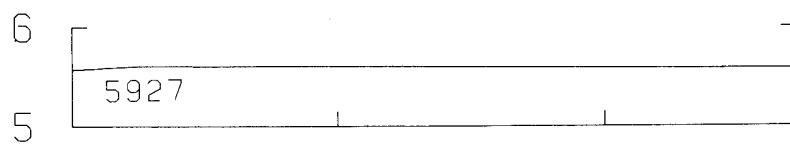
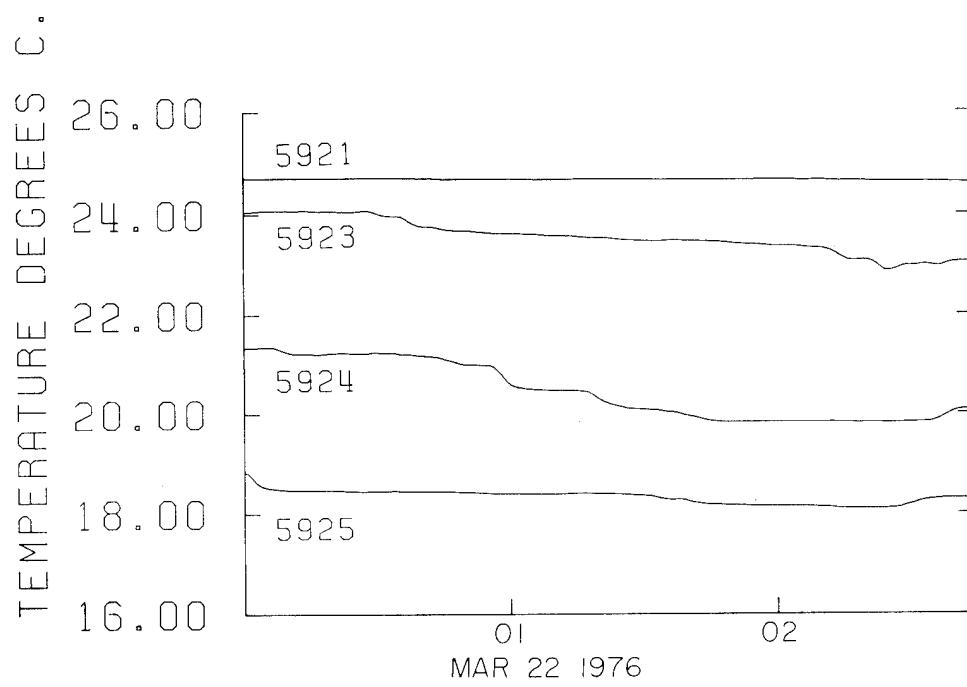
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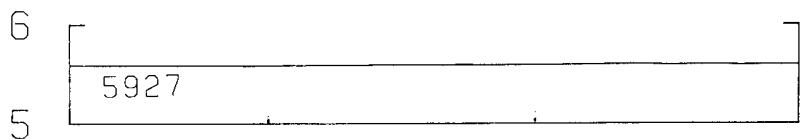
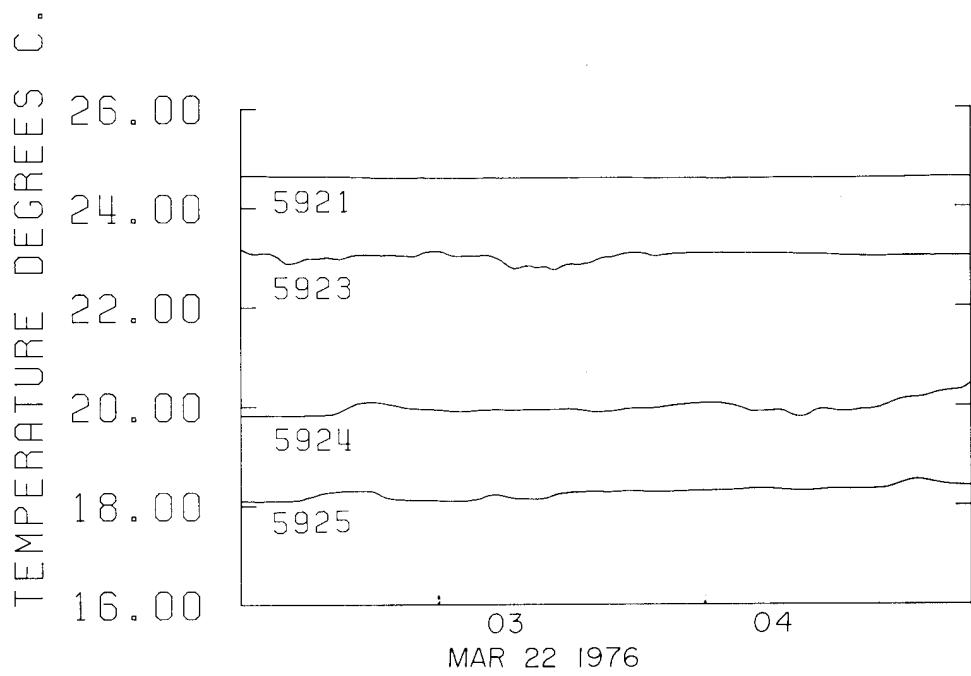












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Appendix 1

OPERATIONS PLAN

1. OBJECTIVE

The objective of the experiment is to install a sub-surface mooring near Hydrophone Array 3 which will contain 5 vector averaging current meters at depths below the surface of 100, 150, 200, 250 and 300 meters. An additional meter will be located 22 meters off the bottom. The sampling rates chosen and the experiment duration should provide excellent information on current speed and direction at these six depths in this range location. Diurnal, semi-diurnal and inertial tidal motions will be indicated as well as other major lunar effects. Data from the top five meters is required by APL, while the data from the bottom meter will be of particular interest to the range. An acoustic pinger at the top of the mooring will be tracked during the first 48 hours of the experiment to provide data on mooring motion. It is estimated that the mooring will be installed for 2 months and will be retrieved using the YFU from Roosevelt Roads.

2. PERSONNEL AND FACILITIES

The USNS LYNCH will be used to deploy the mooring. It is anticipated that 6 hours will be required to complete the survey and installation. The installation will probably be 20 February 1976. Woods Hole Oceanographic Institution (W.H.O.I.) personnel will conduct a bathymetric survey and install the mooring. W.H.O.I. personnel are:

Robert G. Walden	- Principal Investigator
Clayton W. Collins, Jr.	- Electronics Engineer
Peter Clay	- Ocean Engineer
Patrick O'Malley	- Technician

Range tracking facilities will be required.

a) LYNCH

The vessel will be loaded by W.H.O.I. personnel prior to the deployment date. LYNCH personnel will be required to operate the crane to hoist aboard a payout winch and other material. A welder will be required to tack-weld the payout winch and cleats to the deck.

In order to set this mooring at an accurate depth, a preliminary bathymetric survey will be required. The precision depth sounder will be checked against well established hydrophone array depths at array locations 1 and 3 prior to the survey.

Appendix 1 (cont.)

Radar and acoustic tracking information will be supplied to the ship every five minutes. This data will also be required at the bathymetry station on the LYNCH. A tracking pinger will be required on the LYNCH for range tracking of the vessel. An additional pinger will be required for attachment to the mooring.

b) AFWTF

Laboratory space at the Range tracking station for the preparation of six current meters and two acoustic releases is requested. Additional space outside is requested for uncrating, measuring wire rope lengths and assembly of mooring components. Space is also requested for storage of packing crates until the experiment's completion. At that time the recovered mooring components will be recrated by W.H.O.I. personnel for return shipment.

The range truck is requested for transportation of the mooring components and handling gear from the air freight warehouse at St. Croix airport, and to deliver this equipment to the U.S.N.S. LYNCH in Frederiksted on or about 19 February 1976. After recovery of the mooring (approximately April 20, 1976) the truck is again requested to transport gear to and from the YFU at the Frederiksted dock.

To recover the mooring in April, a YFU out of Roosevelt Roads will be required. It is requested that a cherry picker crane and Pengo winch be installed for this purpose. We request that W.H.O.I. personnel (names previously given) be picked up at Frederiksted on the date to be established. After recovery of the mooring it is requested that the YFU again dock at Frederiksted at which time W.H.O.I. personnel will put aboard packing crates and other gear left at the tracking station. The equipment should then be transported to Roosevelt Roads where W.H.O.I. personnel will assist in crating and shipping operations for shipment to Woods Hole, Mass.

During the mooring installation phase the range should provide both acoustic and radar tracking. Range coordinate data is requested for each five minutes during the survey phase of the operation. The USNS LYNCH will be equipped with a pinger for tracking purposes. An additional pinger will be attached near the top of the mooring. The mooring installation phase is estimated at 6 hours. Continued tracking of the mooring line pinger is desired for 48 hours.

Appendix 1 (cont.)

3. OPERATION SCENARIO

The ship's track should be monitored by range acoustic and radar tracking. The range will pass to the ship North and East range coordinates every five minutes. Appropriate course corrections should be applied to maintain track. Bathymetry data will be made continuously during the operation with five minute position times noted on the record.

- a) Depart Frederiksted
- b) Proceed to Array 1 and stop

Coordinates N 53386
E 29079

Check depth

Depth to bottom should be:

$$\begin{aligned} 2350 + 30 &= 2380 \text{ ft.} \\ &= 397 \text{ fath.} \\ &= 726 \text{ meters} \end{aligned}$$

Note depth sounder discrepancy

- c) Proceed to Array 3 and stop

Coordinates N 46668
E 32440

Check depth

Depth to bottom should be:

$$\begin{aligned} 3003 + 3 &= 3033 \text{ ft.} \\ &= 505 \text{ fath.} \\ &= 925 \text{ meters} \end{aligned}$$

Note depth sounder discrepancy

- d) Determine depth sounder correction
- e) Proceed on course to make good 307°T approximately 3600 ft. to Point Alpha

Coordinates N 34600
E 43750

- f) Turn to course to make good 078°T approximately 6350 ft. to Point Baker

Coordinates N 35900
E 50000

- g) Turn to heading to make good 245°T approximately 12000 ft. at a speed of 2 knots to Point Charlie

Coordinates N 30900
E 39300

Appendix 1 (cont.)

- h) Continue on course at best reasonable speed approximately 15000 ft.
to Point Delta

Coordinates N 24750
E 25850

- i) The vessel should then heave-to while the acoustic releases are lowered and tested. The vessel can then take up a course to make good a reciprocal along the same track. (065°T) Establish speed of two knots.
j) During this transit the mooring will be paid out on the surface behind the vessel. The anchor will be held aboard until the drop site at Point Easy.

Coordinates N 34000
E 45800

- k) After anchor launch, the mooring will be in place in approximately 8 minutes. It is estimated that the final mooring position, Point Foxtrot, will be at

Coordinates N 33650
E 45000

- l) The range should obtain X, Y, and Z coordinate data on the mooring line pinger each minute after anchor launch for approximately 15 minutes. X, Y, and Z coordinates of this pinger are desired by the ship at the end of this fifteen minute "settle-out" period.
m) The vessel should heave-to after anchor launch in order to track the release transponder until the anchor bottoms. Coordinate data of the vessel each minute is also requested for this 15 minute period.
n) The vessel will then proceed to pass over the mooring to obtain an independent depth by the fathometer of the top radio float.
o) Secure operations.

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